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RECONNAISSANCE REPORT

CEDAR RIVER AND TRIBUTARIES

BLACK HAWK COUNTY, IOWA, AND VICINITY

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US Army Corps
of Engineers
Rock Island District

92-14548

REVISED FEBRUARY 1992

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CENCR-PD-F 18 February 1992

MEMORANDUM FOR See Distribution

SUBJECT: Black Hawk County, Iowa, Final Reconnaissance Report

1. The final reconnaissance report on the Cedar River and Tributaries, Black Hawk County, Iowa, and Vicinity, was released for 30-day public review on 14 Feb 92.

2. A copy of the report and the Division Engineer's Notice of Completion is attached.

3. Please contact Patricia Risser, extension 6571, for further information.

PATRICIA RISSER
Study Manager

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DEPARTMENT OF THE ARMY
NORTH CENTRAL DIVISION, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, ILLINOIS 60606-7205

February 14, 1992

REPLY TO
ATTENTION OF:

NOTICE OF COMPLETION
of
FINAL RECONNAISSANCE REPORT
on
CEDAR RIVER AND TRIBUTARIES, BLACK HAWK COUNTY, IOWA, AND VICINITY

This is a notice that the final reconnaissance report on the Cedar River and Tributaries, Black Hawk County, Iowa, and Vicinity, study has been completed by the District Engineer at Rock Island, Illinois, and the Division Engineer at North Central Division, Chicago, Illinois, of the U.S. Army Corps of Engineers.

AUTHORITY

The study was authorized by a resolution of the House Committee on Public Works and Transportation adopted on September 8, 1988. The purpose of the study was to investigate the need for flood control, water and recreation development, and allied purposes on the Cedar River and tributaries in Black Hawk County, Iowa, and vicinity, and formulate alternatives to meet those needs.

BACKGROUND

Black Hawk County, Iowa, is located in the north central part of the state of Iowa. The county is 573 square miles in size and is generally level to gently sloping, with some areas strongly sloping. The county is predominantly rural and agricultural except for the Waterloo-Cedar Falls metropolitan area.

The Cedar River is the principal stream in Black Hawk County. Major tributaries of the Cedar River in Black Hawk County include Pleasant Valley, Buck, Black, Hawk, Elk Run, and Crane Creeks. The area the river drains increases significantly as it flows through Black Hawk County. Near the north edge of the county, the stream has a drainage area of 1,660 square miles; at Waterloo, Iowa, 5,174 square miles; and 5,814 square

miles at the southeast or downstream edge of the county. Most of this increase in drainage area is due to areas drained outside of Black Hawk County.

PROBLEMS IDENTIFIED AND ALTERNATIVES CONSIDERED

The study investigated the feasibility of alternatives to reduce flood losses in several communities of Black Hawk County including Janeville, Finchville, Finchford, Dewar, Gilbertville, Hudson, Elk Run Heights, Evansdale, Dunkerton, and the Cedar City and North Cedar neighborhoods in Cedar Falls, Iowa. The flood problems of two other county communities, LaPorte City, Iowa, and the central business district of Cedar Falls, Iowa, are currently being addressed by two separate studies under the authority of Section 205 of the 1948 Flood Control Act, as amended.

Alternatives investigated during the study to alleviate flood problems of the above communities of Black Hawk County included levees and floodwalls, flood warning systems, floodproofing or relocation of structures, permanent evacuation, and dredging and channel modification. None of the structural or non-structural alternatives were found to be economically feasible, except those for Dunkerton, Iowa. An alternative for Dunkerton on Crane Creek, consisting of channel modification and levees, was found to possess marginal economic feasibility. An economically feasible flood warning system for Dunkerton was also formulated. The city of Dunkerton subsequently indicated to the Rock Island District that it currently does not have the financial capability to participate in a cost-shared feasibility study, and that it does not wish to pursue a flood warning system.

RECOMMENDATION

The reconnaissance study investigations indicate that, except for Dunkerton, Iowa, each of the flood control alternatives analyzed for the above Black Hawk County communities would lack economic feasibility. The city of Dunkerton may request to have its flood problems further addressed under the authority of Section 205 of the 1948 Flood Control Act, as amended, at some time when it would be willing to cost-share a feasibility study.

I, therefore, concur with the recommendation of the district engineer that no feasibility studies be undertaken under this authority.

REVIEW PROCESS AND ADDITIONAL PUBLIC INPUT

This report is being submitted to the Washington Level Review Center (WLRC) for review and decision making by the Board of Engineers for Rivers and Harbors, Office of the Chief of Engineers, and the Assistant Secretary of the Army for Civil Works.

Interested parties may present written views on the report to the WLRC. We request that information submitted be new, specific in nature, and bear directly on the findings in the report. Previous statements made on the report or views expressed at public meetings are available to the WLRC.

Written communications should be mailed to the Washington Level Review Center, Kingman Building, Fort Belvoir, Virginia 22060-5576, in time to reach the WLRC by March 14, 1992. If extension of this date is necessary, a written request stating reasons for additional time should be mailed to the WLRC soon after receipt of this notice. Information furnished by mail is given equal consideration and weight as information furnished at public meetings.

Copies of information received by mail will not be furnished to other parties. However, such information will be regarded as public information, unless the correspondent limits its effective value by requesting otherwise. This information may be inspected and notations made by other interested parties in the office of the WLRC.

The Board of Engineers for Rivers and Harbors will not take final action on the report until after expiration of this notice or any extension that may be granted.

FURTHER INFORMATION

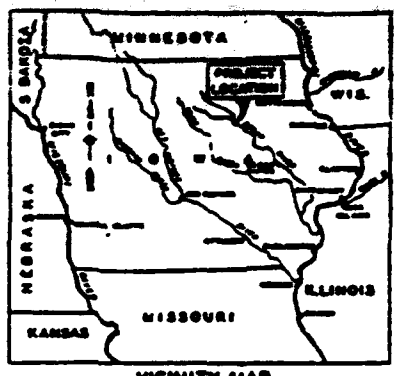
Further information may be obtained from this office or from the District Engineer, Rock Island District, U.S. Army Corps of Engineers, Clock Tower

Building, Post Office Box 2004, Rock Island, Illinois 61204-2004. Additional copies of the report will be available until the limited supply is exhausted. You are requested to give this public notice to anyone known by you who may be interested in the report but did not receive a copy.

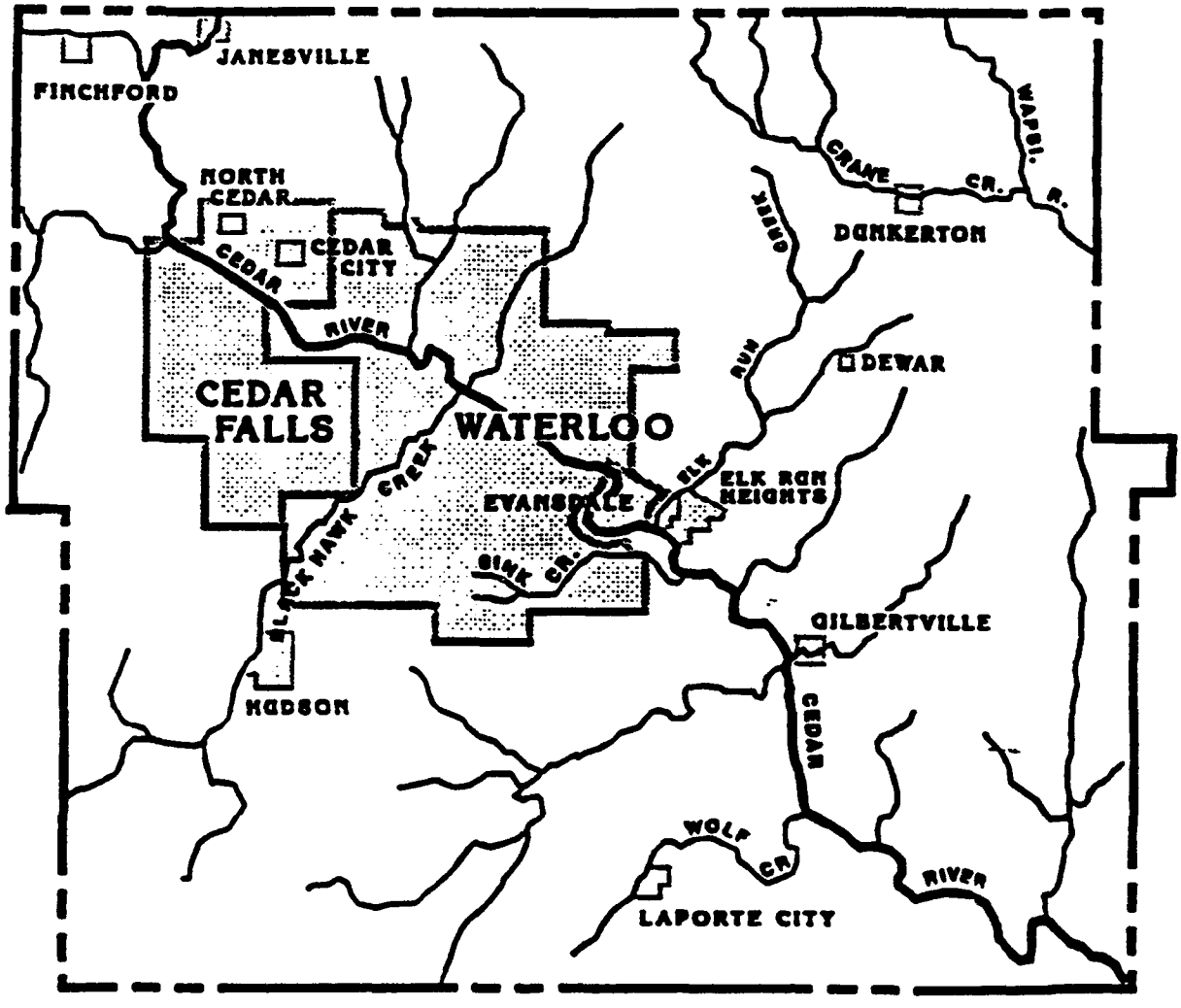
Thank you for your continued interest in our activities.

Jude W. P. Patin
Brigadier General, U.S. Army
Commanding General and
Division Engineer

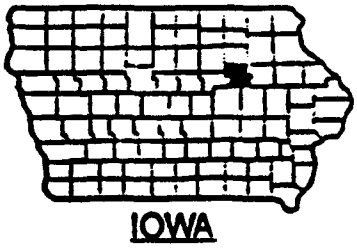
Attachment



VICINITY MAP



BLACK HAWK COUNTY, IOWA



IOWA

KEY MAP

SHOWING COUNTY LOCATION

BLACK HAWK COUNTY, IOWA

STUDY LOCATION AND VICINITY MAP

Attachment

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING — P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF:

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RECONNAISSANCE REPORT

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

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JULY 1991

REVISED FEBRUARY 1992

ACKNOWLEDGEMENT

Many members of the Rock Island District assisted in the preparation of this report. Primary study team personnel who are familiar with the technical aspects of the study are listed below:

STUDY MANAGEMENT	Karen Bahus Patricia Risser
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GEOTECHNICAL INVESTIGATION	Gene Rand
PUBLIC INVOLVEMENT	Suzanne Simmons
REPORT EDITING	Nancy Holling

Special thanks to the Iowa Northland Regional Council of Governments who offered valuable assistance to the Corps of Engineers throughout the course of the study.

REVISED FEBRUARY 1992

SYLLABUS

The Cedar River begins near Hayfield in southwestern Minnesota and flows from northwest to southeast across Black Hawk County in north-central Iowa. Major tributaries to the Cedar River in the county include Black Hawk Creek, Elk Run Creek, Beaver Creek, Crane Creek, and Wolf Creek.

This reconnaissance study, initiated in July 1990, identifies communities within Black Hawk County that experience flooding problems.

Flood damage reduction measures were considered for the communities of Janesville; Finchford; Dewar; Gilbertville; Hudson; Evansdale; North Cedar and Cedar City (city of Cedar Falls); and Dunkerton. Also, sedimentation of the Cedar River and the Cedar Valley Lakes Conservation/Recreation Master Plan are discussed in the report.

The report summarizes the hydraulic, hydrologic, economic, environmental, and cultural resources investigations undertaken for the study area. Alternatives considered for flood damage reduction included snagging and clearing; channel modifications; levees and/or floodwalls; and nonstructural alternatives.

A flood damage reduction plan is economically justified at Dunkerton, Iowa. The plan involves a channel modification to Crane Creek and a levee to protect Dunkerton from flooding. A flood warning system for Dunkerton also was found to be economically feasible. However, the city of Dunkerton, Iowa, is currently unable to participate in a feasibility study for flood control due to a lack of financial capability. Furthermore, the city has stated that it is not interested in pursuing a flood warning project at the present.

Dredging of the Cedar River would have a minor effect on changing flood stages in the area. Dredging of the river based on recreation benefits was found to be economically infeasible.

Local plans for developing the Cedar Valley Conservation and Recreation area were investigated using Federal criteria for benefit-cost computations. Based on this analysis, the overall master plan was found to be viable with a benefit-to cost ratio above 1.0. However, current policy states that projects having primarily recreation outputs are the responsibility of the non-Federal public and private sectors to implement.

The report recommends that no additional feasibility studies be conducted within Black Hawk County, Iowa, under the current study authority.

REVISED FEBRUARY 1992

RECONNAISSANCE REPORT

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

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RECONNAISSANCE REPORT

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

SECTION 1 - INTRODUCTION

This report presents the results of a preliminary investigation of possible solutions to reduce flood damages and to address other water resource problems along the Cedar River and its tributaries in Black Hawk County, Iowa, and vicinity.

STUDY AUTHORITY

The study was authorized by House Resolution 2301, approved September 8, 1988, by the House Public Works and Transportation Committee. The study authorization reads as follows:

> Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on the Iowa and Cedar River Basin, published as House Document numbered 273, Seventy-fourth Congress, and other pertinent reports, with a view to determining whether any modifications of the recommendations therein are advisable at this time in the interest of flood control, water and recreation development, and allied purposes with particular emphasis on Black Hawk County, Iowa.
>
> [Actually, House Document 273 refers to a study not related to the Iowa-Cedar River Basin study; Congressional resolutions adopted July 16, 1945; August 6, 1945; and July 29, 1955, are the pertinent references].

STUDY PURPOSE AND SCOPE

The purpose of each water and related land resources project undertaken by the Corps of Engineers is to contribute to the public interest through National Economic Development (NED). The scope of this reconnaissance study is to determine whether the planning should proceed to the detailed feasibility phase of investigation. This is based on a preliminary appraisal of the Federal interest in the flooding and associated water resource problems in Black Hawk County, Iowa, and vicinity, and if

potential solutions are in accordance with current policies and budgetary priorities.

DESCRIPTION OF STUDY AREA

Black Hawk County is located in north-central Iowa (see plate 1). The Cedar River runs diagonally across the county from northwest to southeast. The Cedar River has its source in the marshy depressions of the glacial drift near Hayfield in southwestern Dodge County, Minnesota. The Cedar River basin is generally long and narrow. As the stream enters Iowa, its gradient tends to increase. Through Mitchell and Floyd Counties, the valley is narrow and bordered by rounded bluffs with frequent limestone exposures. From Nashua to Waverly, the valley widens to 3 to 4 miles in places, but the narrow width generally prevails to the Black Hawk County line above Cedar Falls. In Waterloo, the valley is heavily encroached upon by manmade structures but again widens from 1 to 2 miles below the city proper. The Cedar River basin consists of gently rolling prairie land, and about 95 percent of the 7,819-square-mile basin is in farm land. Other major streams in the county include the Wapsipinicon River, Black Hawk Creek, Elk Run Creek, Beaver Creek, Crane Creek, and Wolf Creek.

The major metropolitan cities in the county are Waterloo, Cedar Falls, and Evansdale, Iowa. Areas studied are predominantly residential, with most residences being permanent year-round dwellings. Preliminary 1990 census data shows that population of the area has decreased somewhat since 1980.

PRIOR STUDIES, ONGOING STUDIES, AND EXISTING WATER PROJECTS

CONGRESSIONALLY AUTHORIZED STUDIES

A feasibility report was completed for the Iowa-Cedar River Basin in June 1982 by the Rock Island District. This feasibility study was the final report on the Iowa-Cedar River Basin investigations in response to congressional resolutions adopted July 16, 1945; August 6, 1945; and July 29, 1955.

The following projects were constructed as a result of the Iowa-Cedar Basin investigations: Coralville Lake, Marshalltown, Marengo, and Wapello on the Iowa River; and Evansdale and Waterloo on the Cedar River.

Studies terminated because their benefit-to-cost ratio did not suggest further Federal participation, or because there was no local sponsor include: Cedar Rapids, Charles City, and Greene, Iowa; as well as Austin and Hollandale, Minnesota, which are all on the Cedar River. Also Chelsea, Iowa City, Vinton, Belmond, and Louisa County Levee Districts Nos. 8, 11, and 23, which are all on the Iowa River.

A preliminary investigation also was undertaken of seven possible reservoir sites in the Cedar River basin. None of the reservoir sites investigated were found to be economically feasible and/or engineeringly feasible. Also, further consideration of the potential reservoir sites lacked local and State support.

CONTINUING AUTHORITIES PROGRAM

Numerous studies have been conducted or are ongoing under Section 205 of the 1948 Flood Control Act, as amended, as part of the Corps of Engineers Continuing Authorities (small projects) program.

Cedar River, Cedar Falls, Iowa: A Section 205 flood damage reduction feasibility phase study is currently in progress. A levee and floodwall system is being considered along the Cedar River from U.S. Highway 218 to the Washington Park Golf Course to protect downtown Cedar Falls from flooding at the 100-year level of protection.

Wolf Creek, La Porte City, Iowa: A Section 205 Feasibility Cost-Sharing Agreement with Initial Project Management Plan is under negotiation with the city. In 1983 a Detailed Project Report was completed and recommended a barrier levee and channel modification to protect the east side of the city from flooding at the 500-year level of protection. At that time, the city decided not to support the project.

Beaver Creek, New Hartford, Iowa: A Section 205 reconnaissance study was initiated in April 1990 to investigate flood damage reduction measures for New Hartford. Flood damage reduction plans investigated for the area were found to be economically infeasible. Therefore, the study will be terminated.

Sink Creek, Waterloo, Iowa: A reconnaissance study under Section 205 was initiated in February 1989 and is nearing completion. Plans considered include a ring levee, channelization, upland land treatment and channel cleanout, floodproofing, and floodplain evacuation. No plans were found to be economically feasible. Therefore, the study will be terminated.

No Name Creek, Waterloo, Iowa: An investigation under Section 205 was undertaken as requested by the city of Waterloo by letter dated July 19, 1988. Plans considered included channel excavation, levees, floodproofing, and floodplain evacuation. No plans were found to be economically feasible. The study was terminated in July 1989.

Cloverdale Acres, Waterloo, Iowa: Cloverdale Acres is a small drainage area with storm water drainage problems. It does not meet Federal criteria for flood control assistance since it is less than 1 square mile in area and less than 800 cubic feet per second (cfs) for the 100-year peak discharge.

STUDIES BY OTHERS

A report entitled *Economic Redevelopment, Summit II*, April 1988, was prepared by the Cedar Valley Partnership. The report discusses the economic recovery needs and issues of the Waterloo-Cedar Falls metropolitan area and northeast Iowa.

FLOODPLAIN INFORMATION REPORTS

Floodplain information reports were prepared by the Rock Island District, Corps of Engineers, for the Cedar River (June 1970) and Black Hawk Creek (December 1968) in Black Hawk County. These reports evaluated the flood hazards along the streams, providing information to local communities to minimize vulnerability to flood damages.

FLOOD INSURANCE STUDIES

Flood Insurance Studies (FIS) published by the Federal Emergency Management Agency (FEMA) are available for the following communities in Black Hawk County: Waterloo (January 1985); Cedar Falls (August 1984); Evansdale (revised November 1984); Elk Run Heights (February 1983); Dunkerton (July 1979); Hudson (July 1979); La Porte City (July 1980); and Janesville (July 1990). An FIS was published in May 1982 for unincorporated areas in Black Hawk County.

During the public involvement process for this study, a concern was expressed over the accuracy of flood insurance maps. Changes to the hydraulics or hydrology of a stream can take place since publication of a flood insurance map, which can alter flood elevations as reported. Communities are responsible for requesting revisions to published maps by submitting new technical data supporting the changed conditions to FEMA. The Iowa Department of Natural Resources should be contacted and will assist communities in requesting FEMA to revise existing FIS's.

SECTION 2 - PLAN FORMULATION

GENERAL

The plan formulation procedure is a process designed to identify and evaluate possible solutions to existing and projected problems and needs. Its goal is to select the most economically feasible and environmentally and socially acceptable solution. For a reconnaissance study, the objective is to determine if there are possible solutions that are economically justified and engineeringly and environmentally sound that warrant further Federal consideration.

ASSESSMENT OF WATER AND RELATED LAND RESOURCES PROBLEMS AND OPPORTUNITIES

EXISTING CONDITIONS

General

The study area encompasses Black Hawk County in north-central Iowa (see plate 1). The county is predominantly rural and agricultural in nature, except for the Waterloo-Cedar Falls metropolitan area. The Cedar River runs diagonally across the county from northwest to southeast.

Geology and Soils

The topography in Black Hawk County is generally nearly level to gently sloping with some areas strongly sloping. In general, the soils in the county are primarily well-drained (pervious) and are underlain by glacial till.

Bedrock in north-central Iowa consists of Paleozoic sedimentary rocks from Ordovician to Cretaceos in age. A gentle dip to the southwest has resulted in an overlapping pattern, exposing the oldest rocks in the northwest and progressing to younger units towards the southwest. Cedar Valley limestone is generally the youngest formation.

Hydrology and Hydraulics

The principal stream in Black Hawk County is the Cedar River, which is a tributary to the Mississippi River. The Cedar River near the north

(upstream) edge of the county has a drainage area of 1,660 square miles; at Waterloo near the center of the county, the river has a drainage area of 5,174 square miles; and at the southeast (downstream) edge of the county, it has a drainage area of 5,814 square miles.

Of the 3,514 square-mile increase in drainage area of the Cedar River in Black Hawk County, 2,639 square miles is contributed by the West Fork of the Cedar River. Other important contributing tributaries include Elk Run Creek (37.4 square miles); Beaver Creek (391 square miles); Virden Creek (14.6 square miles); Dry Run Creek (24.2 square miles); Black Hawk Creek (344 square miles); and Crane Creek (109 square miles). Information concerning historic flooding is found in Appendix A - Hydrology and Hydraulics.

Runoff characteristics of Black Hawk County are typical of a gently rolling terrain that is largely agricultural in nature. Slopes of the streams are moderate, with normal velocities ranging from 2 to 4 feet per second, and are somewhat higher during times of flooding. The streams typically have sandy bottoms and the overbanks are wooded.

A primary water resource concern expressed for the Cedar River in the Waterloo-Cedar Falls urban area is the loss of river depth due to sedimentation. Many people expressed the opinion at coordination meetings that removing silt from the river would reduce the flooding in the area. The Cedar River also has made a change in its channel. On the west side of Sans Souci Island (see plate 15), a control structure directed the river around the east side of the island, except during high flows (exceeding 60,000 cfs). About 1970, this structure was washed out and the main channel of the river returned to the west side of the island, which allowed the east side channel to fill with silt. Although the control structure has been replaced, the Iowa Department of Natural Resources requires the majority of flow to pass through the west channel.

Economic Conditions

Located in the north-central Iowa, Black Hawk County is nearly 573 square miles in size. The county includes the Waterloo-Cedar Falls Metropolitan Statistical Area (MSA) and several smaller communities, including La Porte City, Hudson, and Dunkerton (see plate 1). The 1990 population for the county was approximately 134,000, with approximately 90 percent of this population residing in urban areas.

Economic activities in the county center on agricultural and industrial production. Regional industries produce farm equipment and components, rotary pumps, defense products, cabinets, and food products. Agricultural activities focus on crop production, including corn, soybeans, and feed grains. Major employers in the county include Deere & Company and the University of Northern Iowa (UNI).

In 1989, the Waterloo-Cedar Falls MSA had a labor force totalling 71,600, and a 4.9 percent unemployment rate. County wide unemployment was 6.4 percent in February 1991. Per capita income in the MSA is currently estimated at $12,300; per capita income in the county is approximately $10,200.

Black Hawk County is plagued with flood problems from many rivers and streams. The flood of record along the Cedar River occurred in 1961 and caused $463,000 in damages. The 1968 flood caused three deaths and an estimated $550,000 in damages. Serious flooding also occurred in 1947, 1965, 1969, 1974, 1990, and 1991. Flood damages to the unincorporated areas of Black Hawk County are increasing and include crop losses, livestock losses, farmstead damages, and damages to bridges and roadways.

Environmental Conditions

Black Hawk County contains primarily agricultural lands interspersed with small wood lots, stream-side habitat, and urban surroundings. The Cedar River supports a sport fishery of bass, catfish, northern pike, and carp. The smaller streams support more nongame species such as minnows, chubs, and suckers.

According to the U.S. Fish and Wildlife Service (see Planning Aid Letter in Appendix F), the only Federally endangered species listed for Black Hawk County is the peregrine falcon (*Falco peregrinus*). Migratory bald eagles (*Haliaeetus leucocephalus*) are found along the Cedar River in areas where large trees may be used for perching.

Records of the Natural Areas Inventory of the Iowa Department of Natural Resources show that George Wyth State Park is one of only two locations in the state supporting populations of the blue-spotted salamander (*Ambystoma laterale*). This species may be Iowa's rarest amphibian. It requires shallow woodland ponds for breeding and hibernates in relatively undisturbed woodlands.

The University of Iowa, Office of the State Archaeologist (OSA) compiled the cultural resource site locations and previous survey locations for the study area. The records search verified that at least seven known sites have been previously recorded. The investigation revealed two additional sites: an archaeological site near Hudson, Iowa, and a concrete arch bridge in Dunkerton, Iowa.

Further information on the environmental and cultural aspects of this study, as well as the possible effects of potential alternatives, are provided in more detail in Appendix C, Environmental Considerations.

Recreation

The Cedar River features many backwater lakes and ponds, many of which lie within Black Hawk County. The river, along with its backwater areas, provides diverse recreational opportunities for residents of Black Hawk County, as well as visitors to the area.

Two major metropolitan highway projects, relocated Highway 58 in Cedar Falls and relocated Highway 218 in Waterloo, are providing an opportunity to expand the natural and recreation resources within a 10-mile-long corridor along the Cedar River known as the Cedar Valley Conservation/ Recreation Area. Included in the area is George Wyth State Park. According to the Iowa Department of Natural Resources, George Wyth State Park had over 400,000 visitors in 1987, which makes it the second most heavily used park in the state's system.

A master plan has been prepared to develop the natural and recreational resources of the Cedar Valley Conservation/Recreation Area (see plate 2). Direction for the master plan comes through a joint advisory/steering committee established by the plan coordinators, the Iowa Northland Regional Council of Governments (INRCOG), and the Iowa Natural Heritage Foundation. The Iowa Department of Transportation is assisting with the development of the master plan as mitigation for adverse impacts caused by proposed highway construction. Plan sponsors have indicated that mitigation measures will not complete all of the recommendations made in the master plan, and that financing must come from a variety of sources and jurisdictions over a period of several years.

Over 5,000 acres will comprise the area, which will include lakes totalling about 800 acres. There are about 10,000 boats registered in Black Hawk County and very little close-by water for their use. Also, there are an additional 9,500 boats registered in the 7 counties contiguous to Black Hawk County. It is planned to develop 2 lakes about 300 acres in size each to provide boating and other water resource recreation opportunities. One lake is located at the eastern end of the corridor near George Wyth State Park and will include a marina and allow unrestricted boating (East Lake). The East Lake Master Plan is shown on plate 3. Another lake is planned as an expansion of existing quarries located east of Island Park in North Cedar Falls (West Lake). The West Lake Master Plan is shown on plate 4. Recently, a 44-acre borrow lake was added to George Wyth State Park by the Iowa Department of Transportation to meet the fill material needs for new Highway 20.

In addition to providing lakes for boating and fishing, the master plan also calls for additional wetland acquisition, development, and restoration to benefit a diverse array of wildlife. Plans also recommend preservation of large corridors of woodlands for wildlife management. The University of Northern Iowa is supporting the development of a continuing education and retreat complex on proposed West Lake.

EXPECTED FUTURE CONDITIONS

The most likely future condition for the Black Hawk County area is a continuation of primarily residential flooding problems and continued deterioration of the Cedar River and continued overcrowding and latent demand for recreational facilities and activities.

SPECIFIC PROBLEMS AND OPPORTUNITIES

Three primary means have been employed to focus on potential problems and opportunities for study in the reconnaissance phase. The first involved meetings held with the Iowa Northland Regional Council of Governments (INRCOG) and the Cedar Valley Lakes Board. The second involved a public open house held in Waterloo, Iowa, on August 29, 1990, to receive public comment. The third involved sending a questionnaire to community officials in Black Hawk County as well as surrounding communities in September 1990.

The following is a summary of the problems and needs identified for investigation in the reconnaissance study, the primary organization, agency, or individual expressing the concern, and a reference to this report where specific information can be found:

* Request Corps investigate dredging Cedar River in Cedar Falls-Waterloo area for flood control and recreation - City of Waterloo and Cedar Valley Lakes Board (see pages 25-27).

* Request Corps participation in development of Cedar Valley Lakes Master Plan, especially proposed West Lake - INRCOG and Cedar Valley Lakes Board (see pages 27-28).

* Request Corps advice with hydrologic and hydraulic matters of Cedar Valley Lakes plan - Cedar Valley Lakes Board (assistance will be provided as requested).

* Flood control for the following communities should be investigated - INRCOG and Black Hawk County Engineer (see pages 15-24).

  Cedar River in North Cedar and/or Cedar City;
  West Fork Cedar River in Finchford;
  Cedar River and Buck Creek watershed in Gilbertville;
  Black Hawk Creek in Hudson;
  Crane Creek in Dunkerton;
  Elk Run Heights

* Recent flooding seemed to exceed the limits shown on Flood Insurance maps in the above areas - Black Hawk County Engineer (see page 4).

* Investigate installing a wing dam behind Sans Souci Island to redirect the river back into the original channel - Cedar Valley Lakes Board (see pages 25-26).

* Reinvestigate flood damage reduction on the east side of Elk Run Creek in the reconnaissance study - City of Evansdale (see page 17).

* Investigate providing a recreation trail on levees in Evansdale - City of Evansdale (see pages 27-28).

* Flood Insurance Study maps need to be updated for the Evansdale area - City of Evansdale (see page 4).

* Investigate providing a recreational trail on or along the existing levees/floodwalls in Waterloo - INRCOG and City of Waterloo (see pages 27-28).

* Expressed concern over dredging the Cedar River and where disposal will occur - League of Women Voters and Cedar River Festival (see pages 25-27).

* Expressed concern over chemicals leaching from coal piles at Cedar Falls Utilities and a paint manufacturer along Dry Run Creek - League of Women Voters and Cedar River Festival (the representative attending the open house was advised to contact the Iowa Department of Natural Resources or the U.S. Environmental Protection Agency).

* Expressed concern over the potential loss of wetland habitat from flood damage reduction projects and greenbelt areas along the Cedar River need to be protected - League of Women Voters and Cedar River Festival (see page 14).

PLANNING OBJECTIVES

NATIONAL OBJECTIVE

The national objective of water and related land resources planning is to contribute to economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

Contributions to the National Economic Development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct benefits that accrue in the planning area and the rest of the Nation, and include increases in the net value of those goods and services that are marketed, and those that may not be marketed.

The plan formulation process to accomplish flood damage reduction is formulated and directed by the national planning objective:

> National Economic Development (NED). To enhance the national economic development by increasing the value of the Nation's output of goods and services and by improving the national economic efficiency.

SPECIFIC OBJECTIVE WITHIN THE STUDY AREA

The specific planning objective for this study is as follows:

> To develop flood damage reduction measures which will reduce economic losses associated with inundation of urban areas in Black Hawk County, Iowa, and vicinity, and to incorporate, where possible, recreational development as specified in local plans.

PLANNING CONSTRAINTS

The planning process provides the basis for selecting one of the developed plans and, if appropriate, recommending Federal participation to implement the plan. Planning constraints are conditions that exist which could affect the implementation of a given alternative.

A planning constraint applicable to the reconnaissance study is as follows:

> This study is constrained by applicable laws of the United States and by the State of Iowa, all executive orders of the President, the Water Resources Council's Principles and Guidelines, and current policies and regulations of the Corps of Engineers.

SECTION 3 - ALTERNATIVE PLANS

MEASURES AVAILABLE TO ADDRESS IDENTIFIED PROBLEMS AND OPPORTUNITIES

Improvements eligible for Federal participation are of two kinds: those intended to modify flood behavior (generally structural measures) and those intended to modify the ways in which people would otherwise occupy and use floodplain lands and waters (generally nonstructural measures).

Structural measures include dams and reservoirs; levees and floodwalls; and channel alterations and diversions. Flood control reservoirs can reduce floodflows by temporarily storing water. Levees and floodwalls provide protection by serving as a physical barrier between the river and adjacent flood-prone land. Channel improvement helps to alleviate flood problems by increasing the flow efficiency of the channel.

Nonstructural solutions include such measures as floodplain zoning, flood-proofing, floodplain evacuation, and flood-warning systems.

Zoning or other regulatory controls provide a planned program and regulate development and land use, thereby preventing potential damage to future development.

Floodproofing is a combination of structural changes and adjustments to properties subject to flooding and is used primarily to reduce or eliminate flood damage. This measure involves raising existing structures, properly elevating future structures, or providing panels that can be placed over building doors and windows to effectively keep out floodwaters. Extensive structural modifications are often necessary to withstand the hydrostatic pressure forces associated with floodproofing.

Evacuation of homes and businesses is usually considered potentially viable when the structures lie in areas subject to frequent flooding and where floodwaters exceed a depth of 3 feet. This measure involves acquiring the homes or businesses and relocating the occupants and their possessions to homes or buildings located outside of the floodplain that are of similar worth and in decent, safe, and sanitary condition.

Relocation of homes or businesses involves physically lifting the structure off its present foundation, moving it, and then lowering it onto a suitable foundation outside of the floodplain. Relocation may be viable in areas subject to frequent flooding. It is considered where it is structurally feasible and less costly than evacuation. Some structures, e.g., brick and steel, are normally infeasible to relocate due to structural limitations.

Flood forecasting is provided on a regional basis by the National Oceanic and Atmospheric Administration (NOAA). NOAA issues frequent warnings of potential flood-producing storms. Often, the flood warnings are preceded

by a "severe weather or flood watch." The flood warnings and statements on flood conditions are transmitted to city officials, as well as to area newspapers, radio, and television stations. The available services include flash flood warnings and major flood forecasts based on radar coverage of the area, numerous rainfall reporting stations, river gages, anticipated weather conditions, and hydrologic factors.

Flood warning and preparedness systems can reduce flood damages primarily by allowing public officials and members of a community more advance warning of a flood. The earlier warning, in turn, allows the community more time to take preventive actions such as protecting or moving household and business contents, and vehicles.

A flood-warning system is a water level sensing device or devices which are connected to an alarm. As water levels rise and reach a potentially threatening level, the alarm is activated. This would alert officials of an imminent flood and prompt them to warn floodplain residents via the civil defense siren or some other public address system.

Flood warning systems cannot eliminate all damages for any given flood event, but can reduce them. Also, public response to flood warning can vary greatly since these systems depend on people to prevent damages.

FORMULATION OF ALTERNATIVE PLANS

The formulation of alternative plans is accomplished by combining the different nonstructural and/or structural measures into resource management systems and allowing the formulation of alternatives to address the planning objectives. A range of measures which would reduce damages from flooding were identified and evaluated.

Alternative plans are formulated which contribute to the Federal objective of NED. In addition to a plan which reasonably maximizes contributions to NED, other plans may be formulated which reduce net NED benefits in order to further address other Federal, State, and local concerns not fully addressed by the NED plan.

In developing a plan to reduce flood damages, standards and procedures have been followed which have been set forth in various flood control acts, policies, and related regulations established by the Corps of Engineers for flood control. All plans considered, therefore, were evaluated in accordance with the criteria explained in the paragraphs that follow.

TECHNICAL CRITERIA

The degree of protection afforded by any method of flood damage reduction proposed will be the highest practicable, consistent with engineering,

economic, and environmental criteria, safety, and local desirability and acceptance.

ECONOMIC CRITERIA

Except for certain environmental or socially related instances, the average annual tangible benefits of a proposal will exceed the annual charges on the investment.

ENVIRONMENTAL AND OTHER CRITERIA

The public health, safety, well-being, and quality of life of the residents of the locality concerned are the prime considerations in the development of a project. Any protective works would be designed to disturb existing natural and cultural features as little as possible. Any flood control measure that would adversely impact environmental and cultural resources would require mitigation. This includes development in wetland areas. As defined by CEQ guidelines (40 CFR 1508.20), the five levels of mitigation are:

a. Avoiding the impact altogether by not taking a certain action or parts of an action.

b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

d. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

e. Compensating for the impact by replacing or providing substitute resources or environments.

Any required mitigation plans would be developed during the feasibility phase of study, and would require coordination between the Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the Iowa Department of Natural Resources.

PRELIMINARY EVALUATION AND SCREENING OF ALTERNATIVE PLANS

FLOOD DAMAGE REDUCTION MEASURES, COMMUNITIES IN AND SURROUNDING BLACK HAWK COUNTY

Communities located along the Cedar River and its tributary streams have been experiencing recurring flood damages. These communities were identified to the Rock Island District through the public involvement process. Study team members performed site visits to each community to investigate the flood damage potential and further analysis required in the reconnaissance study. A summary description of the investigation conducted for each community, and the conclusions of each investigation, is provided below. More information concerning the hydraulic and hydrologic investigations can be found in Appendix A; details on the economic and social assessments in Appendix B; and information on environmental and cultural resources in Appendix C.

Janesville, Cedar River

Janesville (1986 estimated population 110) is located along the Black Hawk-Bremer County boundary in northeastern Iowa, about 12 miles north of the Waterloo-Cedar Falls metropolitan area (see plates 1 and 5). The economy is primarily agricultural-oriented industry and business.

A well-defined floodplain exists along the Cedar River in this area, and the community is primarily located on the bluff. Flooding has occurred in 1945, 1961, and 1965; the flood of record (gaging station at Janesville) occurred in March 1961 at 50-year level.

A preliminary economic assessment was conducted for the community. It concluded that because of the relatively low average annual damages for structures and businesses affected by flooding, flood damage reduction benefits would not be of sufficient magnitude to justify Federal participation in structural or nonstructural plans. Therefore, no further investigations were undertaken in this reconnaissance study.

Finchford, West Fork Cedar River

Finchford is a small unincorporated town located about 12 miles northwest of Waterloo (see plates 1 and 6). Thunderwoman Park, a County Conservation Area, is located in the floodplain. Flooding along the West Fork of the Cedar River occurred in July 1968 and June 1990, causing damage to residential structures.

Hydraulic and hydrologic investigations were undertaken to include the record flood of June 1990. A revised frequency curve was developed (see Appendix A). While the stage for the June 1990 flood event was a record high, the stream flow producing the record event was not. This is because the channel and floodway of the West Fork Cedar River became heavily vegetated after two years of drought, which hindered the flow of water and caused a higher stage than normally would be expected.

A preliminary economic assessment was conducted for the community. It concluded that because of the relatively low average annual damages for structures affected by flooding, flood damage reduction benefits would not be of sufficient magnitude to justify Federal participation in structural or nonstructural plans. Therefore, no further investigations were undertaken in this reconnaissance study.

Dewar, Pleasant Valley Creek

Dewar is an unincorporated town located about 8 miles northeast of Waterloo (see plates 1 and 7). Flooding along Pleasant Valley Creek occurred in June and August 1990. The June flooding affected about 25 residences and 5 businesses, and total damages were estimated to be about $20,000. Flooding along Pleasant Valley Creek in August 1990 affected about 32 residences and businesses.

A preliminary economic assessment was conducted for the community. It concluded that because of the relatively low average annual damages for structures affected by flooding, flood damage reduction benefits would not be of sufficient magnitude to justify Federal participation. Therefore, no further investigations were undertaken in this reconnaissance study.

Gilbertville, Cedar River and Buck Creek

Gilbertville (1986 estimated population 760) is located about 9 miles southeast of Waterloo (see plates 1 and 8). A Flood Insurance Rate map was prepared for the community in 1974, and FEMA determined it to be a minimal flood-prone community. Flooding during the summer of 1990 affected the city park, but no damages were sustained. The city appropriately utilizes their flood-prone land for a park and baseball diamond. The minimal amount of potential flood damage reduction benefits precludes further Federal participation.

Hudson, Black Hawk Creek

Hudson (1986 estimated population 2,100) lies about 5 miles southwest of Waterloo (see plates 1 and 9). The economy is primarily agricultural-

oriented industry and business. A summary of the environmental and cultural resources in the area is provided in Appendix C.

The drainage area at the mouth of Black Hawk Creek is 344 square miles; at the gaging station in Hudson, the drainage area is 303 square miles. Black Hawk Creek meanders across farm land. The creek bottom is primarily sand with silt deposits in some areas. Average slope of the creek bottom is about 4 feet per mile in Black Hawk County. Most of the developed areas of Hudson are outside of the 100-year floodplain (Flood Insurance Study July 1979). A large portion of the floodplain is occupied by city and county parks.

A preliminary economic assessment was conducted for the community. It concluded that because of the relatively low average annual damages for structures potentially affected by flooding, flood damage reduction benefits would not be of sufficient magnitude to justify Federal participation. Therefore, further studies were not undertaken in this reconnaissance report.

Elk Run Heights, Elk Run Creek

In August 1990, the city of Elk Run Heights requested assistance for a storm water flooding problem in the Shirley Subdivision. The flooding problem did not meet Federal criteria for a flood control study (800 cubic feet per second or more for a 100-year peak discharge at the prospective project site). The Rock Island District provided technical assistance and offered recommendations that the city may undertake to help alleviate the flooding problems (see correspondence in Appendix F).

Evansdale, Elk Run Creek

As part of the Evansdale Local Flood Protection project, completed in 1982, a levee was constructed along the right (west) bank of Elk Run Creek from U.S. Highway 20 downstream to the I-380 embankment (see plate 10). A flood warning system also was installed on Elk Run Creek.

The city of Evansdale requested that flood protection be investigated for the left (east) bank of Elk Run Creek. Flood protection at the 100-year elevation for the east side of Elk Run Creek was investigated during the Evansdale project, but no measures were found to be economically feasible due to a lack of sufficient flood damages.

Since the existing levee along the right bank of Elk Run Creek was designed assuming confinement on both sides of the creek, structural flood damage reduction measures considered for the left bank will not alter the existing profiles of the creek. Environmental and cultural resources of the area are described in Appendix C.

A preliminary economic assessment was conducted for the area. Land use on the east side of Elk Run Creek is primarily city park and vacant land. Current policy precludes the conversion of primarily vacant land (land without significant structural improvements) to more valuable use as a result of a flood damage reduction project. In addition, Executive Order 11988 stipulates avoiding direct or indirect support of development in the base floodplain wherever there is a practicable alternative. Therefore, flood damage reduction measures for this area were not pursued further in this reconnaissance study.

Dunkerton, Crane Creek

Dunkerton (1986 estimated population 600) is located about 15 miles northeast of Waterloo (see plates 1 and 11). The economy of the area is primarily agriculture and agricultural-oriented industry and business. Much of the floodplain area lying south of the Crane Creek channel is developed with residential and commercial structures. The floodplain of a small unnamed tributary which flows in a northerly direction to Crane Creek is also partially developed with residential structures.

Vegetated areas along Crane Creek consist of palustrine forested wetland, dominated by American elm, green ash, silver maple, and box elder. Aquatic habitat diversity of Crane Creek is high. A city park, which has numerous trees and a small pond, is located north of Crane Creek. Wildlife values for the park are fairly low due to its developed nature. A concrete arch bridge providing access from the town to the park may be eligible for inclusion in the National Register. More information on the environmental and cultural resources of the area can be found in Appendix C.

Crane Creek reacts rapidly to heavy rainfall. Residents have reported that flooding can occur quickly and hydrologic investigations support this.

Dunkerton has experienced flooding in 1968 and in 1990. The Des Moines Register, dated July 20, 1968, reported that an estimated 500 persons had been evacuated due to Crane Creek flooding about 20 blocks of the community with up to 5 feet of water. In June 1990, major flooding again occurred, with up to 5 feet of water flowing along Lincoln and Main Streets.

Structural flood protection measures were investigated for Dunkerton. The Crane Creek floodway alignment follows Main Street, a distance of 400 to 500 feet from the left bank of the creek. Therefore, a channel improvement was a consideration during formulation of structural plans in order to relocate the floodway alignment closer to the stream and avoid excluding a large portion of the community from flood damage reduction (see Appendix A). About 2,140 feet of the channel would be widened to 70 feet, requiring the removal of about 15,000 cubic yards of material.

In conjunction with the channel improvement, a levee and floodwall plan was formulated for Dunkerton. The plan is shown on plate 12. The plan consists of about 3,720 feet of impervious levee with 1V to 3H side slopes and a 10-foot top width, averaging about 6.5 feet in height including 3 feet of freeboard. About 980 feet of concrete wall is needed where right-of-way is not sufficient for construction of a levee. Sandbag closures would be required at Canfield Street and at two locations where the line of protection crosses the Chicago Northwestern railroad tracks. The preliminary interior drainage systems consists of three gated outlet structures. Estimated construction costs for the preliminary plan at a 100-year level of protection are shown in Appendix D.

The Dunkerton area of the Black Hawk County Flood Control project, as proposed in this report, involves an estimated 23 ownerships (6 residential properties, 2 city-owned parcels, 7 commercial businesses, 4 agricultural tracts, 3 riverbank properties, and 1 railroad tract). The project requires acquisition of 2.0 acres in fee simple title and acquisition of 21.36 acres in permanent easements. The total estimated project acreage is 23.36 acres. The project requires 5 potential Public Law 91-646 relocations (2 residences and 3 businesses).

The estimated value of real estate costs associated with the proposed plan is $340,000, as shown in table 1A.

TABLE 1A

Real Estate Cost Estimate
100-Year Structural Alternative
Crane Creek, Dunkerton, Iowa
(May 91 Prices)

1.	Lands and Damages (Including Contingency)		$204,300
2.	P.L. 91-646 Relocations		$100,000
3.	Administrative Costs		
	a. Federal		$ 12,000
	b. Non-Federal		$ 23,000
			$339,300
		say	$340,000

As summarized in the Economic Assessment (Appendix B), 98 residential, 11 commercial, and 7 public structures are located in the city's 100-year floodplain. Average annual damages, including future residential growth, total $137,600. Benefits accruing from the reduction of flood damages include: reduced residential, structural, and commercial damage; flood insurance savings; and emergency expense savings.

An economic summary for the 100-year flood damage reduction plan is provided in table 1B.

TABLE 1B

Benefit and Cost Summary
100-Year Structural Alternative
Crane Creek, Dunkerton, Iowa
(May 91 Prices, 8-3/4% Discount Rate, 100-Year Life)

Total First Cost	Total Annual Benefits	Annual Charges	Net Annual Benefits	Benefit-to-Cost Ratio
$1,744,800	$157,100	$152,700	$4,400	1.03

As shown in table 1B, the preliminary structural levee and floodwall plan, with channel modification, to protect Dunkerton from Crane Creek flooding at the 100-year level of protection is economically justified. Dunkerton, Iowa, has expressed interest in a flood damage reduction project; however, the city is currently unable to participate in a feasibility phase study due to a lack of financial capability (see pertinent correspondence appendix).

Nonstructural measures such as permanent evacuation, relocation, and floodproofing of the structures lying in the Crane creek floodplain also were considered for Dunkerton. Permanent evacuation and relocation would have a negative impact upon NED due to the high cost of acquiring the large number of properties located in the floodplain and relocating the occupants and residents. The benefits associated with flood damage reduction would not offset the high cost of relocating homes and businesses in the Crane Creek floodplain.

Floodproofing involves raising structures above flood heights, protecting them individually or in groups by levees, or providing removable panels that can be placed over doors and windows. Floodproofing can require extensive structural modification in order for structures to withstand the hydrostatic pressure forces associated with floodproofing. Floodproofing has the most promise in the following situations:

* Where moderate flooding with low stage, low velocity, and short duration is expected;

* Where there is sufficient lead time to get protection devices in place;

* Where individuals desire to solve their flood problems without collective action, or where collective action is not possible; and

* Where activities depend on riverbanks and floodplain locations, but need some degree of protection such as water intakes or wastewater treatment facilities.

It would not be viable to floodproof the structures in the Crane Creek floodplain with temporary closure devices. The depth of floodwater is generally high and warning time is not sufficient to ensure that protection devices can be put into place. Also, most structures are wood and are not capable of withstanding hydrostatic pressures.

Raising the structures above flood heights also was not considered to be economically feasible for Dunkerton. Since floodwater depths are high, structures would need to be raised an average of 4 to 5 feet. In addition, floodwater over 3 feet in depth would render the streets impassable to emergency vehicles. Therefore, nonstructural alternatives were not considered further for Dunkerton.

A flood warning system with a community preparedness and response plan also was investigated for Dunkerton. Crane creek is a flashy stream, and under the worst case condition (i.e., the basin experiencing 3 inches of runoff in 1 hour) flooding would occur in about 3 hours. Under more usual runoff conditions, flooding would occur in about 6 to 8 hours. Economic studies indicate that placement of a flood warning system would reduce average annual damages by 3 percent, or $4,100.

A flood warning alert gage with a pressure sensor, radio transmitter, and power supply would be installed on the Highway 281 bridge. A rain gage also would be installed upstream of the alert gage in the Crane Creek basin. Black Hawk County is currently using a county-wide system with alert gages on Black Hawk Creek, the Cedar River, Virden Creek, and Elk Run Creek. The county communications dispatcher handles all flood alerts from the flood warning systems. Compatible equipment is being used for the flood warning plan at Dunkerton.

The estimated costs associated with a radio frequency flood warning system for Dunkerton are shown in table 2, and a benefit-cost summary is shown in table 3. The city of Dunkerton is not interested in pursuing a flood warning system at the present time (see pertinent correspondence appendix).

TABLE 2

Estimated Costs
Flood Warning and Preparedness Plan
Dunkerton, Iowa

Item	Quantity	Total Cost ($)
Alert Gage with Sensing Equipment, Housing, and Installation	Job	2,500
Radio Equipment with Solar Power, and Installation	Job	3,200
Rain Gage, Gage House, and Installation	Job	3,700
Development of Community Preparedness and Response Plan	Job	5,000
	SUBTOTAL	14,400
	CONTINGENCY (20%)	2,900
	TOTAL COST	17,300

TABLE 3

Benefit-Cost Summary

Total First Cost	$17,300
Annualized Cost	$2,000
Annual First Cost	($1,500)
Annual O&M	($ 500)
Annual Benefit	$4,100
Benefit-Cost Ratio	2.1
Net Benefit	$2,100

North Cedar and Cedar City, Cedar River

Recurrent flood damage has occurred to North Cedar and Cedar City (city of Cedar Falls) located along the Cedar River (see plates 1 and 13). Flood damage reduction measures for these areas were addressed in *Interim Review of Reports for Flood Control, Iowa and Cedar Rivers, Iowa and Minnesota, Cedar Falls, Iowa*, prepared by the Rock Island District in May 1976. Three levee and/or floodwall alignments for the North Cedar and Cedar City areas as well as upstream reservoirs were investigated in the 1976 report, and none were found to be economically feasible.

As discussed previously, a flood warning alert gage is located on the Cedar River at Cedar Falls. Sufficient warning time is available for the North Cedar and Cedar City areas. Environmental and cultural resources of the areas are described in Appendix C.

North Cedar, Cedar River

Reinvestigation of flood damage reduction measures were undertaken in this reconnaissance study for the North Cedar area. The most economical line of structural protection for the area consists of about 9,075 feet of sand levee and raising 1,550 feet of road about 7 feet high (see plate 14). The levee would have a 10-foot top width with 1V to 4H side slopes on the riverside, and 1V to 5H side slopes on the landside. For the 100-year level of protection, the levee would have an average height of about 10.5 feet, including 3 feet of freeboard. Two road ramps would be required to maintain access on Cottage Row Road and Lake Street. Sandbag closures would be required where the line of protection crosses highway 218 and the Illinois Central railroad. The preliminary interior drainage plan consists of three gravity outlet structures for interior storm water drainage during normal flows on the Cedar River, a large ponding area, and temporary pumping for interior storm water drainage during blocked gravity conditions due to high water stages on the Cedar River.

Preliminary project costs were based on levee embankment, stripping, raising the road, obtaining sand from the area proposed for West Lake, and the preliminary interior drainage plan. A summary of costs is provided in Appendix D.

Appendix B summarizes economic studies performed for the North Cedar study area. The study area 100-year floodplain includes 286 residential, 18 business, and 1 public structures. Despite the large number of structures in the floodplain, average annual damages for the study area total just $120,300. As indicated by the benefit-cost summary in table 4, neither the 50-year nor the 100-year flood damage reduction alternative is economically justified.

TABLE 4

Benefit-Cost Summary
Cedar River, North Cedar, Iowa
(May 91 Prices, 8-3/4% Discount Rate, 100-Year Life)

Plan	Total First Cost	Total Annual Benefits	Annual Charges	Net Annual Benefits	Benefit-to-Cost Ratio
50-year	$2,105,700	$126,200	$198,200	($ 72,000)	0.64
100-year	$2,698,300	$152,500	$254,000	($101,500)	0.60

As previously discussed for Dunkerton, nonstructural measures would not offer a viable or cost-effective solution to reducing flood damages in the North Cedar area.

Cedar City, Cedar River

Reinvestigation of flood damage reduction measures also were undertaken for the Cedar City area. As shown on plate 14, structural protection at a 100-year level of protection was investigated for three areas - a ring levee west of Cedar City, a ring levee and floodwall system surrounding Cedar City, and a levee and floodwall plan east of Cedar City. In addition, floodproofing, permanent evacuation, and relocation were considered for a small residential area north of Cedar City.

Ring Levee West of Cedar City. The ring levee plan would protect the commercial and industrial area along Highway 218 (see plate 14). The preliminary plan consists of 4,200 feet of sand levee with a similar design as described for North Cedar. At the 100-year level of protection, the levee would average about 9 feet high, including 3 feet of freeboard. A sandbag closure would be required where the alignment crosses Highway 218, and the preliminary interior drainage plan would consist of a gravity outlet and temporary pumping facility. Preliminary project costs for the plan were based on levee embankment, stripping, obtaining sand from the area proposed for West Lake, and the preliminary interior drainage plan. Total construction costs at the 100-year level of protection are $1,145,400. A cost summary is provided in Appendix D.

The West Cedar City 100-year floodplain contains two residential and four commercial/industrial facilities. As presented in Appendix B - Economic Assessment, the study area experiences average annual damages totalling $14,500. A summary of benefits and costs is presented in table 5. As indicated, the proposed flood damage reduction plan lacks Federal interest.

Ring Levee and Floodwall System, Cedar City. The ring levee and floodwall plan surrounding Cedar City would protect residential, commercial, and industrial structures (see plate 14). The preliminary plan consists of about 11,200 feet of sand levee with a similar design as described for North Cedar, and about 1,050 feet of concrete floodwall. At the 100-year level of protection, the average levee and floodwall height would be about 10.5 feet, including 3 feet of freeboard. Three road ramps would be necessary to maintain access; gated closure structures would be needed where the line of protection crosses the railroad (east side) and a road; and temporary sand bag closures on the west side of the plan where the levee crosses the railroad. The preliminary interior drainage plan consists of a ponding area, gravity outlet structure, and a temporary pumping facility.

Preliminary project costs were based on levee embankment, concrete floodwall, stripping, obtaining sand from the area proposed for West Lake, and the preliminary interior drainage plan. Total construction costs for the preliminary plan at the 100-year level of protection are $3,721,500. A summary of costs is provided in Appendix D.

An economic assessment for Cedar City is provided in Appendix B. Cedar City experiences nearly $95,000 in average annual damages. The study area has approximately 200 structures in the 100-year floodplain, including 18 businesses. Table 5 presents a summary of benefits and costs associated with the 100-year flood damage reduction plan. As indicated, the plan is not economically feasible.

Levee and Floodwall System East of Cedar City. A levee and floodwall plan was investigated for the residential and commercial area east of Cedar City (see plate 14). The preliminary plan consists of about 4,640 feet of sand levee and floodwall, with a design similar to what has been described previously. At the 100-year level of protection, the average height of the levee and floodwall would be 12 feet, including 3 feet of freeboard. A road ramp would be necessary to maintain access. The preliminary interior drainage plan consists of a ponding area, gravity outlet, and a temporary pumping facility. Preliminary project costs for the preliminary plan were based on levee embankment, concrete floodwall, stripping, obtaining sand from the area proposed for West Lake, and the preliminary interior drainage plan. Total construction costs for the plan at the 100-year level of protection are $1,678,100. A summary of costs is provided in Appendix D. An economic summary of the structural plans developed for the entire Cedar City area is shown in table 5.

East Cedar City experiences average annual damages totalling $36,100. The study area 100-year floodplain contains 12 commercial or industrial structures. In addition, the floodplain includes more than 300 residential structures, the majority of which are mobile homes. Project benefits include flood insurance and emergency cost savings. A detailed economic summary for the study area is provided in Appendix B, with a summary of benefits and costs in table 5. As indicated, the proposed 100-year levee plan lacks Federal interest, with a benefit-cost ratio less than 1.0.

TABLE 5

Benefit-Cost Summary for Cedar River,
Cedar City, Iowa, Reaches
(May 91 Prices, 8-3/4% Discount Rate, 100-Year Life)

Study Area	Plan	Total First Cost	Total Annual Benefits	Annual Charges	Net Annual Benefits	Benefit-Cost Ratio
West Cedar City	100-year	$1,231,900	$ 14,600	$107,800	($ 93,200)	0.14
Cedar City	100-year	$4,002,400	$116,200	$350,300	($234,100)	0.33
East Cedar City	100-year	$1,804,800	$ 44,400	$158,000	($113,600)	0.28

Nonstructural Measures, North of Cedar City. As shown on plate 14, the residential area north of Cedar City contains about 45 homes. Structural flood damage reduction measures for this area would not be economically feasible to construct. The area is also located in the established floodway of the Cedar River. The average flooding depth is about 3 feet for the 50-year frequency flood and about 4.5 feet for the 100-year frequency flood. Residences in the area are mostly of wood construction.

Relocation would not be feasible for most of the residences because of structural limitations. Because of the high depths of flooding, flood-proofing with temporary closures would not be viable. Also, wood structures are not capable of withstanding hydrostatic pressures. The high costs associated with permanent evacuation would preclude economic feasibility for this nonstructural measure.

It appears that the most viable and cost-effective nonstructural measure would be to raise the structures. For the 50-year frequency flood, the structures would require an average raise of 2 feet. Preliminary costs would be $970,000. For the 100-year frequency flood, the structures would require an average raise of about 4 feet, which would cost about $1,265,000. An economic summary for the plans is provided in table 6.

TABLE 6

Economic Summary of Raising Structures
North of Cedar City

Level of Raise	Total Costs ($)	Annual Charges ($)	Annual Benefits ($)	Benefit-to-Cost Ratio
50-year	970,000	70,000	9,700	0.14
100-year	1,265,000	112,300	10,900	0.10

CHANNEL MODIFICATIONS, CEDAR RIVER, CEDAR FALLS-WATERLOO URBAN AREA

Dredging the Cedar River

Sediment and debris collection in the Cedar River channel is perceived to be causing more adverse flooding to occur in the urban areas. Also, the Cedar River is becoming less navigable for recreational boating. The area of the Cedar River of greatest concern is that reach of the channel above the Iowa Public Service dam through the Sans Souci Island area, and to Cedar Falls (see plate 15). Sans Souci Island is about 160 acres in size and is classified as palustrine forested wetland. Mature bottomland hardwood species consist of cottonwoods, silver maple, green ash, and box elder.

In 1967, the Rock Island District surveyed the Cedar River in conjunction with the Waterloo Local Flood Protection project. The river was resurveyed in 1991 for this reconnaissance study in order to estimate the increase in sedimentation since 1968.

Sediment sections were taken at river miles 199.5 (plate 16); 201.4 (plate 17); and 204.0 (plate 18) and compared to the data obtained in 1967 at the same locations. The comparison is illustrated on plates 16 through 18. Generally, the cross sections taken 24 years apart are very similar. The section at river mile 201.4, however, which cuts across Sans Souci Island, showed some notable differences. This is because a few years ago a control structure on the west branch of the river around Sans Souci Island was damaged. The Iowa Department of Natural Resources required a flow operational plan for the new structure that allows most of the flow of the river to be carried through the west branch. This has reduced the flow and water depth because of increased sedimentation in the east branch where several boat docks are located. Hydraulically, however, the increase in sedimentation has been offset by scouring in the west branch, so that flow conveyance of the total section is largely unchanged.

In conclusion, the minor increase in sedimentation observed in the area would have little effect on increasing flood levels of the Cedar River. Dredging of the river would have little effect on reducing flooding in the area or increasing the carrying capacity of the channel during floods. Dredging may enhance recreational potential of the Cedar River, but only for a temporary period of time.

A preliminary cost for dredging the Cedar River for recreational purposes was considered for two reaches based on comments received at the public open house. Reach 1 extends from the dam in Cedar Falls to the Iowa Power Dam in downtown Waterloo, a length of about 7.6 miles. Reach 2 considered a shorter reach, from George Wyth State Park to the Iowa Power Dam in Waterloo, a length of 5.2 miles.

Costs were solely based on a hydraulic dredging unit cost of $3.50 per cubic yard and it was assumed that adequate disposal sites would be available close to the river within the dredging reach. Costs for mechanical dredging and hauling sediment to disposal sites would involve substantially higher costs.

A detailed summary of the benefits calculation is provided in Appendix B. Potential recreation enhancement benefits were quantified using the Unit Day Value Method for general recreation facilities. A total of 331,000 recreation activity days potentially would be enhanced by the proposed dredging alternatives, with a net increase in value per activity day ranging from $0.15 to $0.28 (see table B-9).

The costs and benefits associated with dredging the Cedar River are shown in table 7 below. As seen from the table, dredging the river would not be economically feasible.

TABLE 7

Economic Summary of
Dredging the Cedar River

	Reach 1 Dredge 2 Feet	3 Feet	Reach 2 Dredge 2 Feet	3 Feet
Quantity of Sediment Removed (cy)	1,040,000	1,560,000	700,000	1,050,000
Estimated Cost ($)	3,640,000	5,460,000	2,450,000	3,675,000
Annual Charges	561,000	841,400	377,600	566,400
Potential Annual Benefits (Recreation)	79,400	92,700	49,700	62,900
Benefit-Cost Ratio	0.14	0.10	0.13	0.11

Another idea suggested at the public workshop is to raise the Iowa Power Dam (Fourth Street). It is not feasible to permanently raise the dam, since any such raise would increase flood heights and subsequently reduce the freeboard levels at the Waterloo and Evansdale Local Flood Protection projects. A non-permanent alternative may exist, such as using an inflatable rubber dam which could be lowered in advance of high water. Raising the dam about 2 feet could raise water depths a corresponding 2 feet for about 4 to 5 miles upstream of the dam.

Sediment Input Control

Sediment input control includes measures to reduce streambank erosion in tributary watersheds; sedimentation basins to decrease sediment loads to waterways; and upland watershed treatment practices to reduce soil erosion. These measures are currently part of programs administered by State and Federal agencies such as the U.S. Soil Conservation Service. Efforts expended in these programs provide the only long-term solution to sedimentation problems. Further improvements to upland areas would continue to be implemented by the currently responsible agency. The Corps of Engineers has no general authority to participate in projects of this nature.

DEVELOPMENT OF CEDAR VALLEY CONSERVATION/RECREATION MASTER PLAN

As described earlier, two major metropolitan highway projects, relocated Highway 58 in Cedar Falls and relocated Highway 218 in Waterloo, are providing an opportunity to expand open space and recreation resources within a 10-mile-long corridor along the Cedar River in the Waterloo-Cedar Falls metropolitan area.

Consistent with the Federal interest and the philosophy that direct beneficiaries should share in the recreation costs at Federal projects, Corps participation is limited to sharing the development costs of the recreation opportunities created only by its projects. If a recreation feature does not take advantage of an opportunity created by the project, then the facility should be provided by others.

Current policy on recreation development at non-reservoir projects (EP 1165-2-1, dated February 15, 1989, and ER 1105-2-100), is as follows:

* Recreation will not influence formulation of the structural project which must attain a benefit/cost ratio greater than unity without recreation.

* Recreation developments must be within the lands acquired for the basic project, except for separable lands required for access, parking, potable water, sanitation and related developments for health, safety, and public access. The cost of lands provided by local interests for the basic project are not included for recreation cost-sharing purposes. Operation, maintenance, and replacement costs are the responsibility of the non-Federal sponsor.

* The level of recreation development at a structural project may not increase the Federal project cost by more than 10 percent without approval of the Assistant Secretary of the Army (Civil Works).

* Recreation development, including separable lands required for public access, health, and safety, are cost-shared on a 50 percent basis between Federal and non-Federal interests.

* Appropriate facilities for cost-sharing should be in accordance with the approved list shown in Appendix E, Recreation Facilities Check List (ER 1105-2-100).

Therefore, under the current policy constraints for recreation, the Corps of Engineers cannot directly participate in development of the items under development in the Cedar Valley Lakes Master Plan, including new trail development.

While the Corps of Engineers cannot directly participate in the Cedar Valley Lakes Master Plan, an economic assessment for the planned improvements was prepared as part of this reconnaissance study (see Appendix B). This assessment examined benefits for those improvements for which the Iowa Northland Council of Governments provided costs. Benefits for the proposed recreation facility enhancements were assessed using the Unit Day Value Method for general recreation facilities. It was assumed that the master plan development would fulfill 20 percent of latent demand for power boating, waterskiing, and fishing within the primary market area. Annual recreation benefits and costs associated with the master plan are described in detail in Appendix B and summarized in table 8.

TABLE 8

Benefit-Cost Summary for Recreation Developments
Associated with the Cedar Valley Lakes Master Plan
(May 91 Prices, 8-3/4% Discount Rate, 50-Year Life)

Annual Benefit	$454,000
Annual Cost	$357,400
Benefit-Cost Ratio	1.3
Net Benefits	$ 96,600

POTENTIAL ALTERNATIVE PLANS FOR FEASIBILITY PHASE STUDY

For the flood damage reduction and associated water resource plans evaluated in this reconnaissance study, the preliminary plans which are economically feasible appear to be the levee and floodwall plan, with channel modification, and a flood warning system for Dunkerton, Iowa.

SPONSOR'S VIEWS AND PREFERENCES

A meeting was held on June 4, 1991, to discuss the preliminary flood damage reduction plan at Dunkerton, Iowa, with city officials. Cost-sharing requirements of the feasibility phase study and construction were discussed. The city of Dunkerton indicated its interest in proceeding with a feasibility phase study for flood control and is pursuing possible avenues of financial assistance.

By letter dated September 11, 1991, the city of Dunkerton expressed its continued interest in a flood control project. However, the city stated that it lacks the financial capability to pursue such a project at present. The city also stated that it did not wish to pursue a flood warning project at the current time. A copy of this letter is included in the pertinent correspondence appendix.

SECTION 4 - PRELIMINARY FINANCIAL ANALYSIS

The Dunkerton, Iowa, Local Flood Protection project with 100-year protection has an estimated total cost of $1,646,200 (May 1991 price levels). Based on the current cost-sharing requirements of 25 percent for flood control, the local share of the project costs amounts to $411,600.

The city of Dunkerton, Iowa, is pursuing potential funding sources for the feasibility phase cost-sharing requirements as well as for a possible project. One potential source of funding being investigated is obtaining assistance from Black Hawk County. The city currently lacks the financial capability to proceed with the feasibility phase.

SECTION 5 - SUMMARY OF STUDY ANAGEMENT, COORDINATION, PUBLIC VIEWS, AND COMMENTS

The objective of public involvement is to actively involve the public in order to ensure that this study responds to public needs and preferences to the maximum extent possible, within the bounds of local, State, and Federal programs, responsibilities, and authorities.

A Notice of Study Initiation and announcement of a public open house were distributed to Federal, State, county and city agencies; congressional representatives; businesses; special interest groups; and the public on August 1, 1990 (see Appendix F).

A briefing on study needs and a tour of the area was conducted by INRCOG for Corps and Congressional representatives on June 4, 1990. A public open house was held on August 29, 1990, at the INRCOG Board Room in Waterloo, Iowa, to obtain views on study needs and direction.

The public was involved in the formulation of this reconnaissance study throughout the course of the study. This was accomplished by contacts and meetings with INRCOG and community leaders; with local, State, and Federal representatives; and the public.

Initial coordination with the U.S. Fish and Wildlife Service (USFWS) was made in November 1990 when preliminary plans and maps were provided. The USFWS has provided a Planning Aid Report, dated January 23, 1991, which can be found in Appendix F.

Coordination with the State Historic Preservation Officer (SHPO) was initiated in a letter dated August 9, 1990. A report, dated January 1991 and discussing the cultural resource information for the study area, was sent to the SHPO. The SHPO responded by letter dated February 18, 1991 (see Appendix F) which stated that "We concur with the Corps that cultural resource surveys should be conducted in any areas within the (study area) that may be proposed for specific flood control solutions." Coordination will be maintained with the SHPO as project plans are developed in detail.

SECTION 6 - RECOMMENDATION

A preliminary analysis and evaluation of alternative plans as presented in this report was undertaken for the objective of reducing economic losses caused by flooding and other water resource problems in Black Hawk County, Iowa, and vicinity. A structural plan to reduce flood damages at Dunkerton, Iowa, and a nonstructural plan for flood warning are economically feasible projects and appear to be in the Federal interest. The appropriate process for further investigations at Dunkerton is to pursue the project under the authority of Section 205 of the 1948 Flood Control Act, as amended. However, the community of Dunkerton, Iowa, is currently unable to participate in a feasibility phase study for flood control due to a lack of financial capability. Furthermore, the city has stated that it is not interested in pursuing a flood warning project at the present.

Development of the recreational resources of the area was considered in this report. The master plan developed for the Cedar Valley Lakes corridor appears to meet Federal criteria for economic feasibility. However, pursuance of the master plan elements is not in accord with current Federal policy on recreational development.

I therefore recommend that no feasibility studies be conducted within Black Hawk County, Iowa, under this authority.

John R. Brown
Colonel, U.S. Army
District Engineer

CENCD-PE-PD-PF (CENCR-PD-F/Jul 91) (1105) 1st End
Mr. Jackson/cld/(312) 886-5471
SUBJECT: Black Hawk County, Iowa

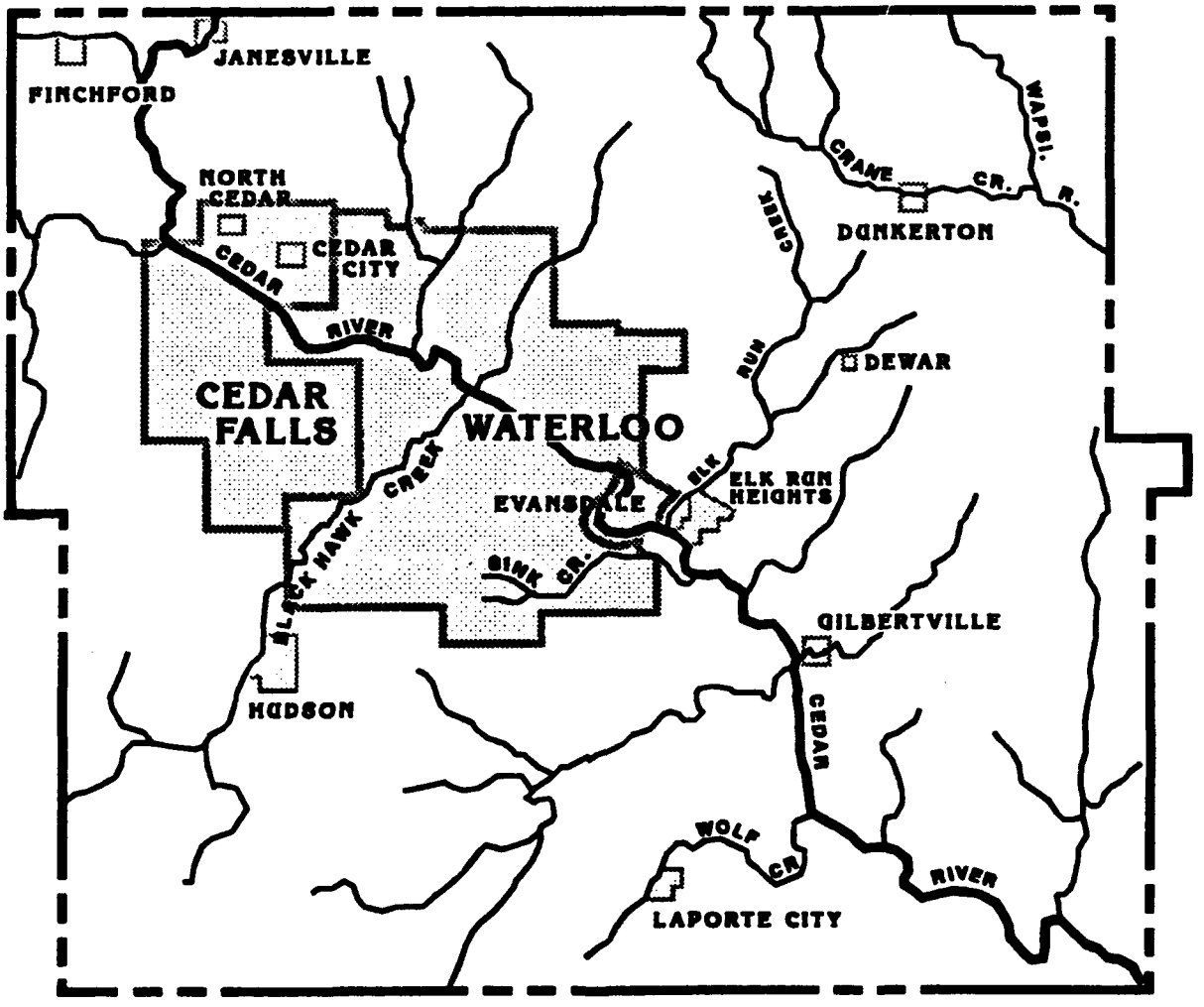
Cdr, North Central Division, U.S. Army Corps of Engineers,
111 N. Canal Street, Chicago, IL 60606-7205 7 FEB 1992

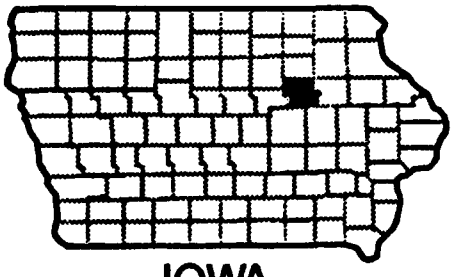
FOR HQUSACE (CECW-P), WASH DC 20314-1000

1. Concur with the recommendation of the district commander.

2. The HQ, NCD, POC is Mr. Elihu Jackson, CENCD-PE-PD-PF, (312) 886-5471.

JUDE W. P. PATIN
Brigadier General, USA
Commanding





IOWA

KEY MAP

SHOWING COUNTY LOCATION

BLACK HAWK COUNTY, IOWA

STUDY LOCATION AND VICINITY MAP

PLATE 1

Cedar Valley conservation/recreation area

planning coordinators:

IOWA NORTHLAND REGIONAL COUNCIL OF GOVERNMENTS

IOWA NATURAL HERITAGE FOUNDATION

planning consultant:

CRAIG RITLAND LANDSCAPE ARCHITECT

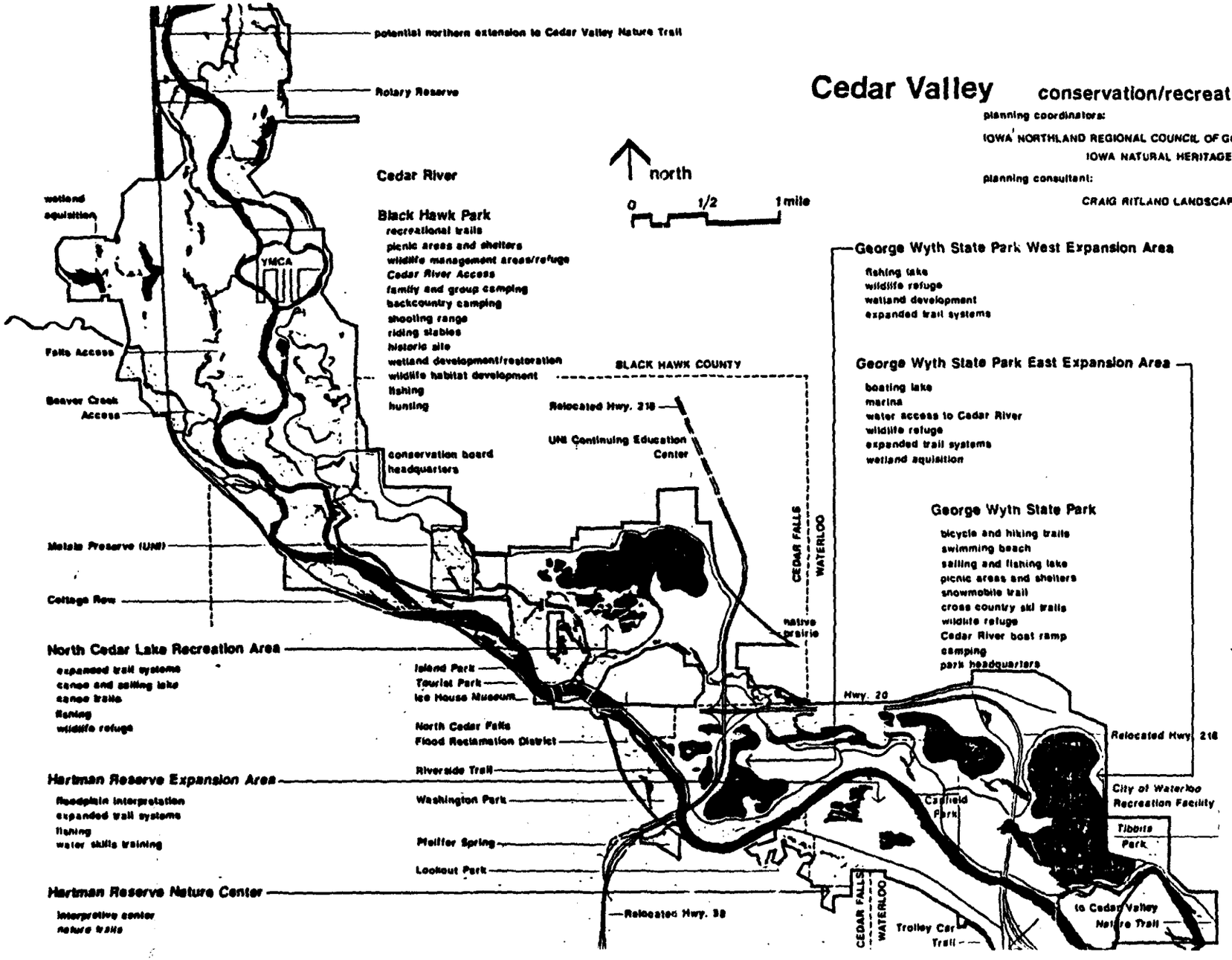


PLATE 2

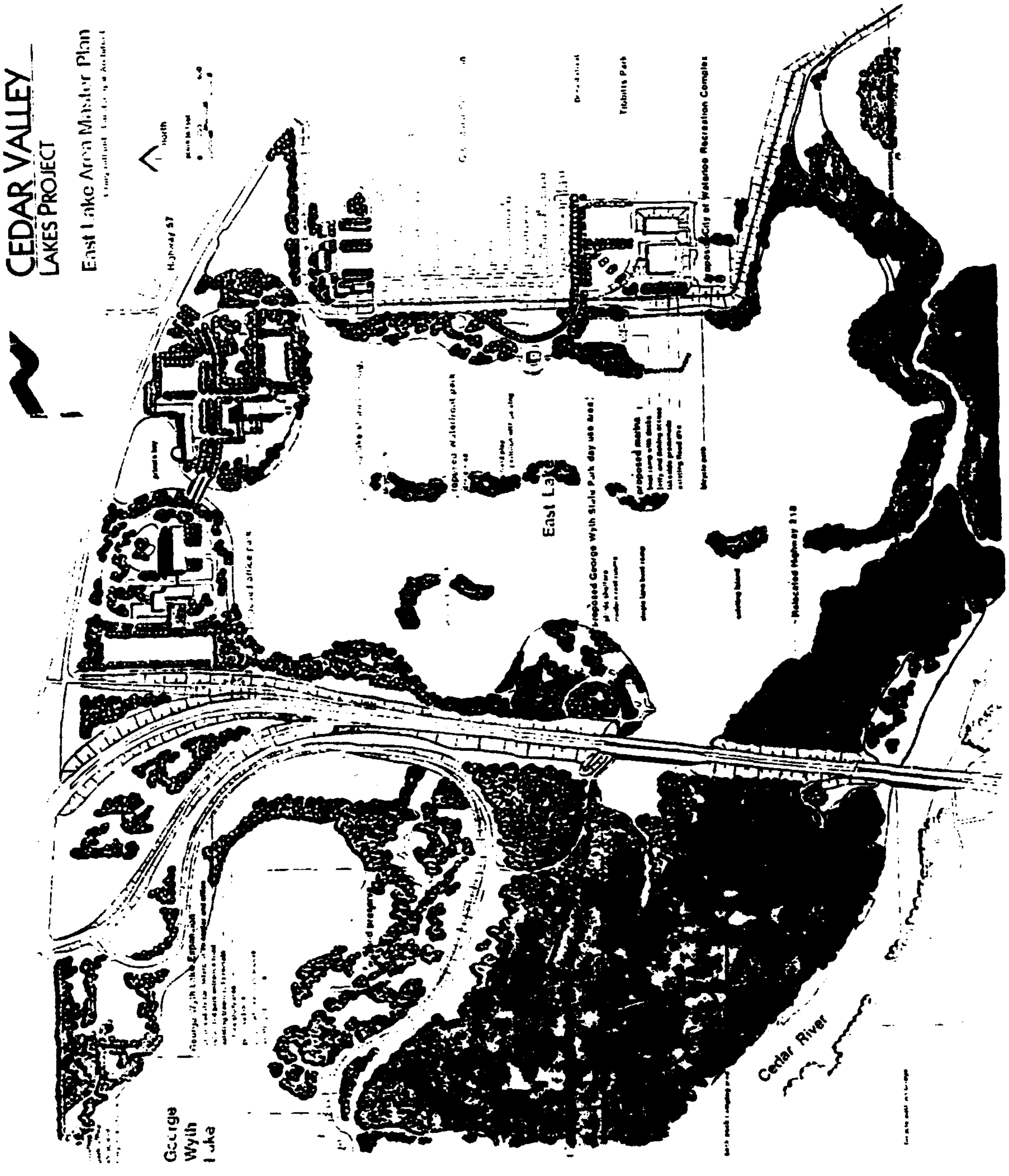

CEDAR VALLEY
LAKES PROJECT
East Lake Area Master Plan
East Lake
George Wyth Lake
Cedar River

PLATE 3

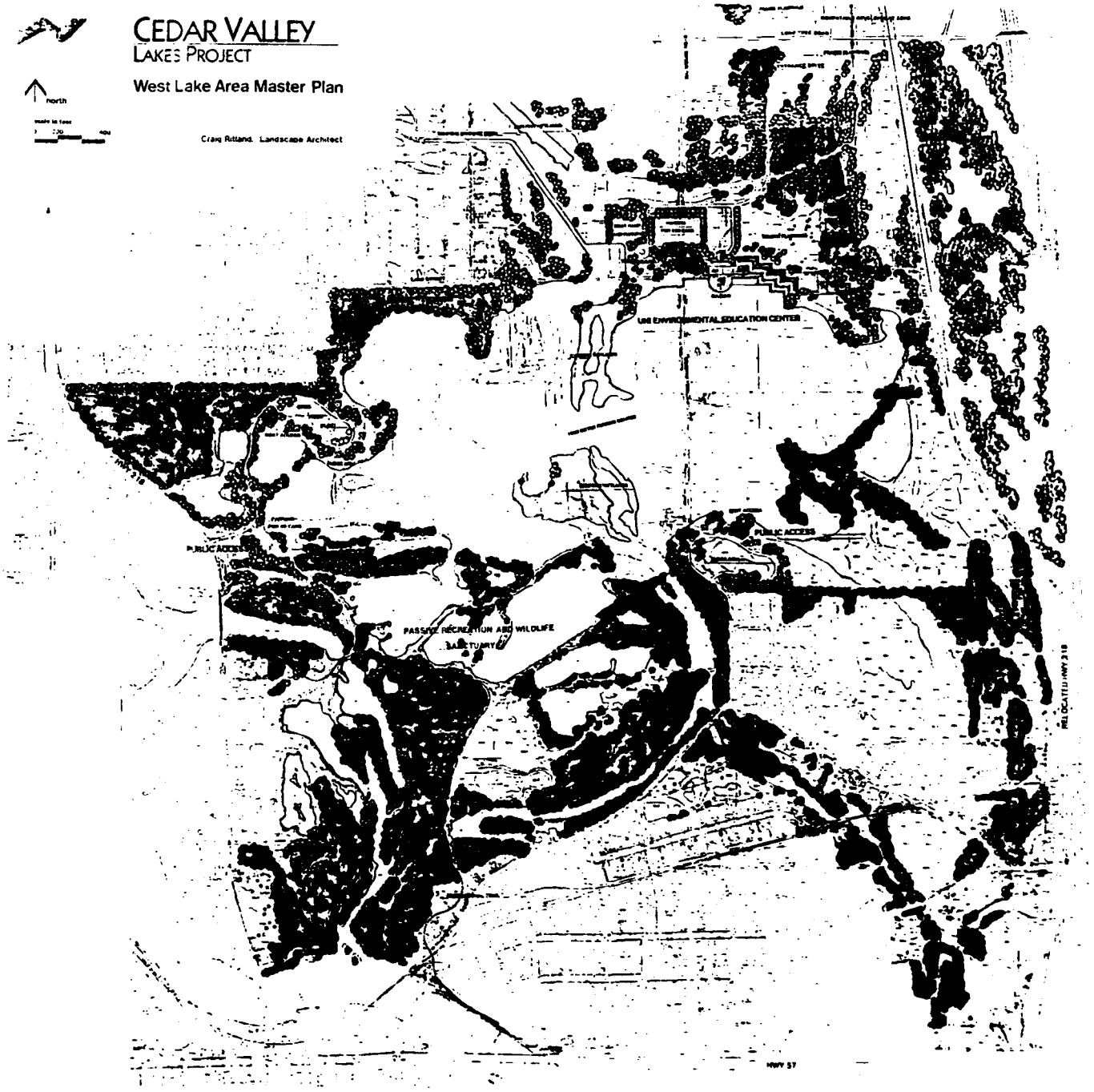
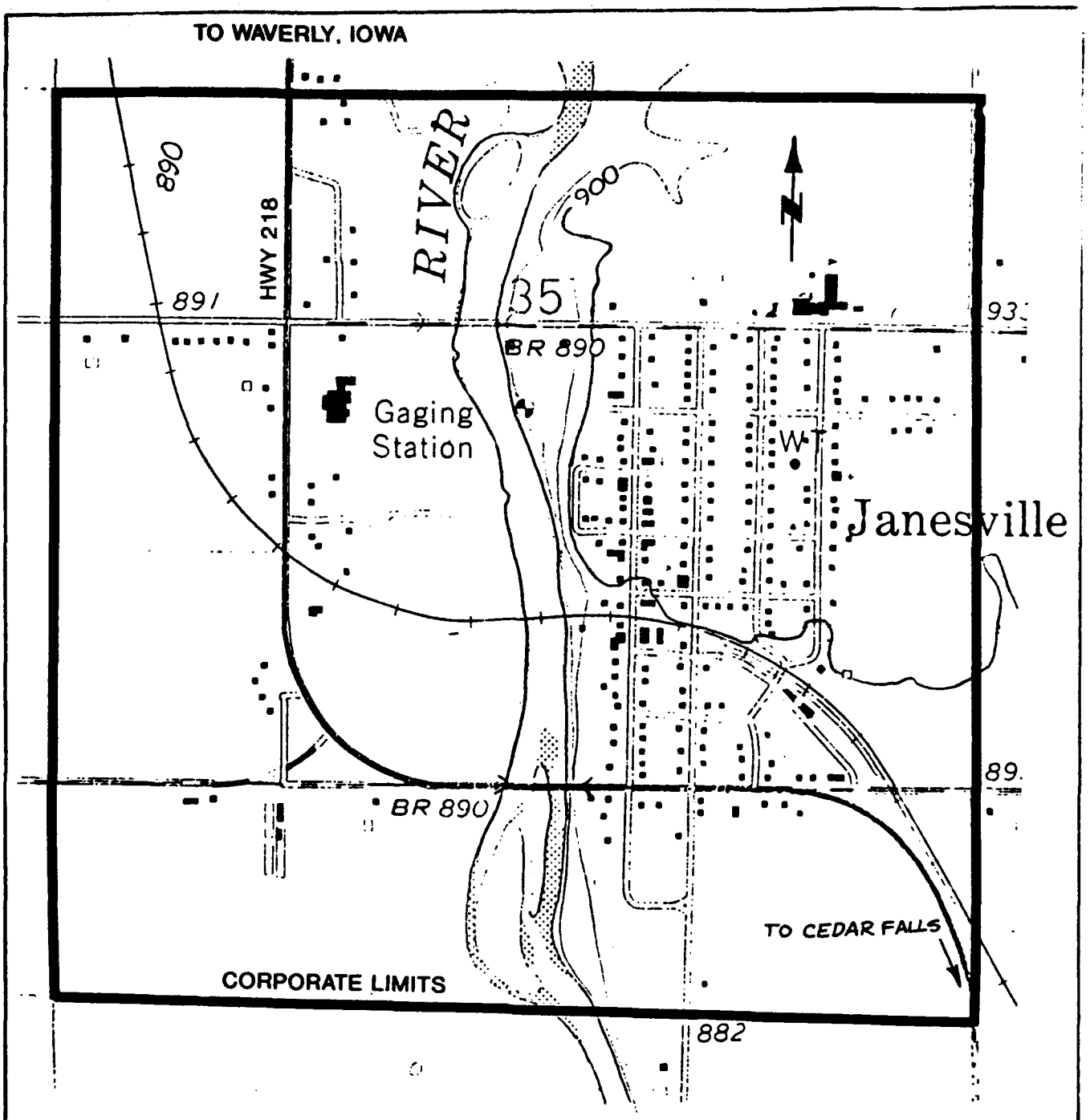

CEDAR VALLEY
LAKES PROJECT
West Lake Area Master Plan
north
Craig Rittand, Landscape Architect
UW ENVIRONMENTAL EDUCATION CENTER
PUBLIC ACCESS
PUBLIC ACCESS
PASSIVE RECREATION AND WILDLIFE
SANCTUARY
RELOCATED HWY 318
HWY 57

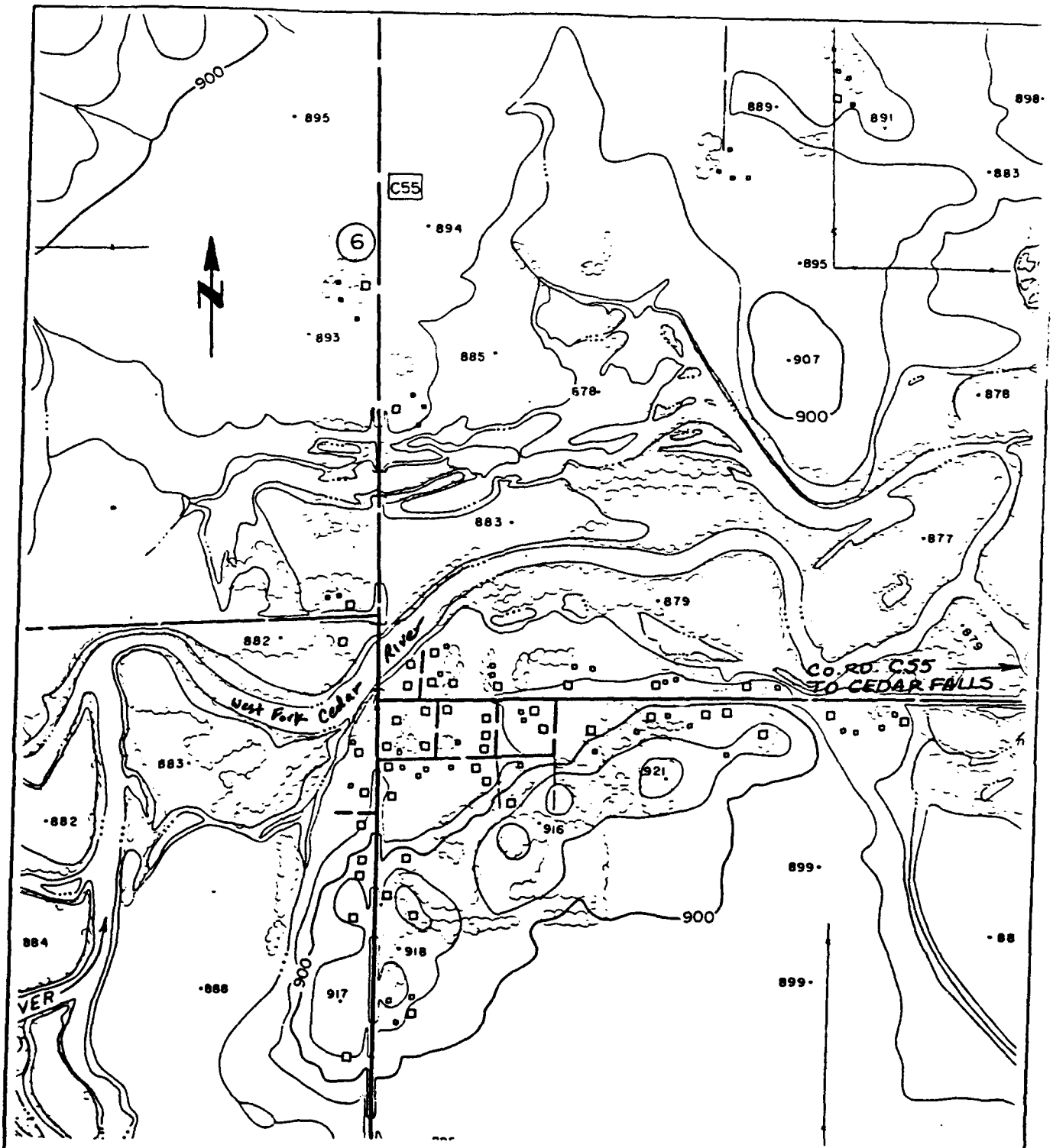
PLATE 4



CEDAR RIVER

JANESVILLE, IOWA

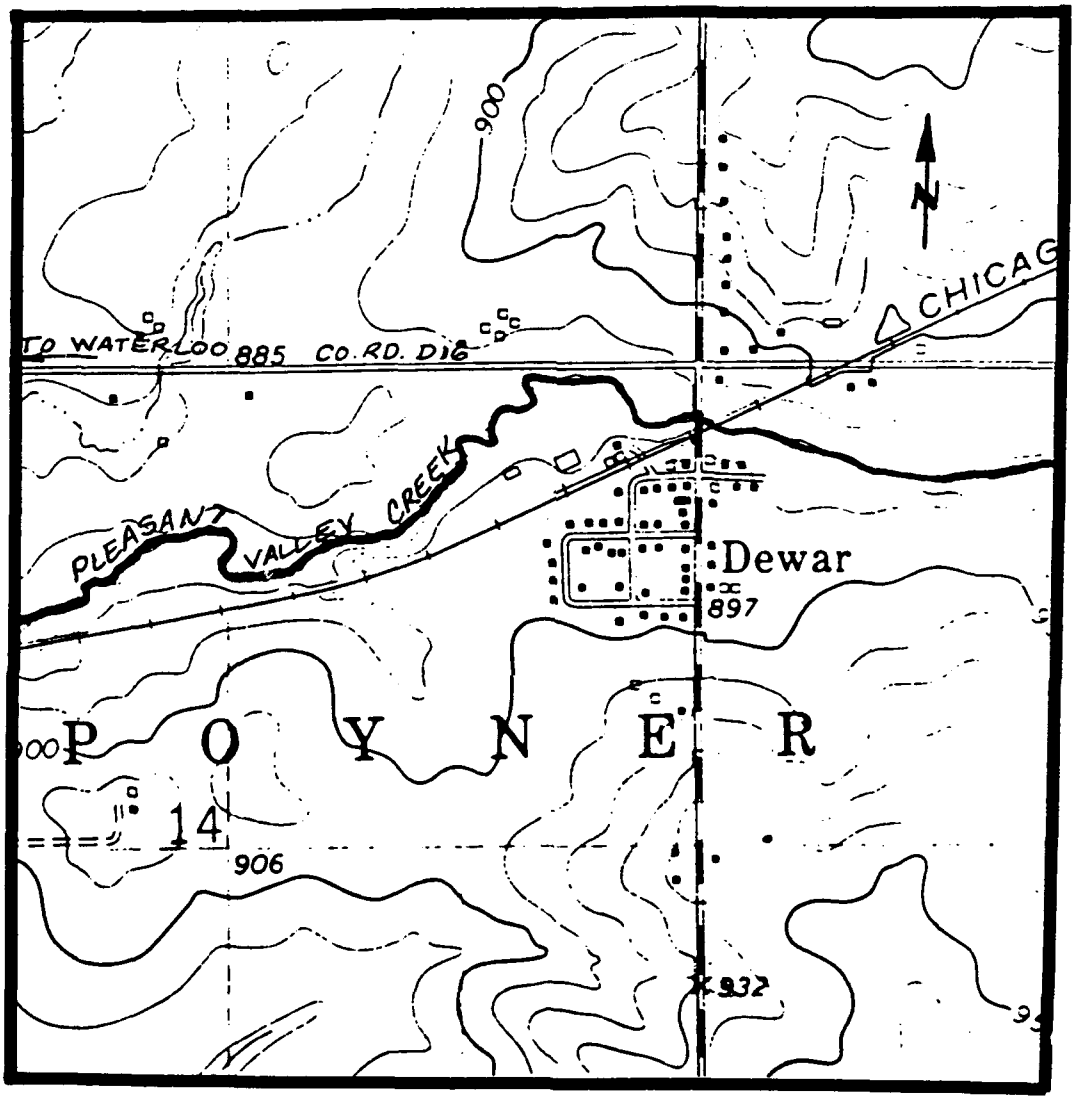
PLATE 5



WEST FORK
CEDAR RIVER

FINCHFORD, IOWA

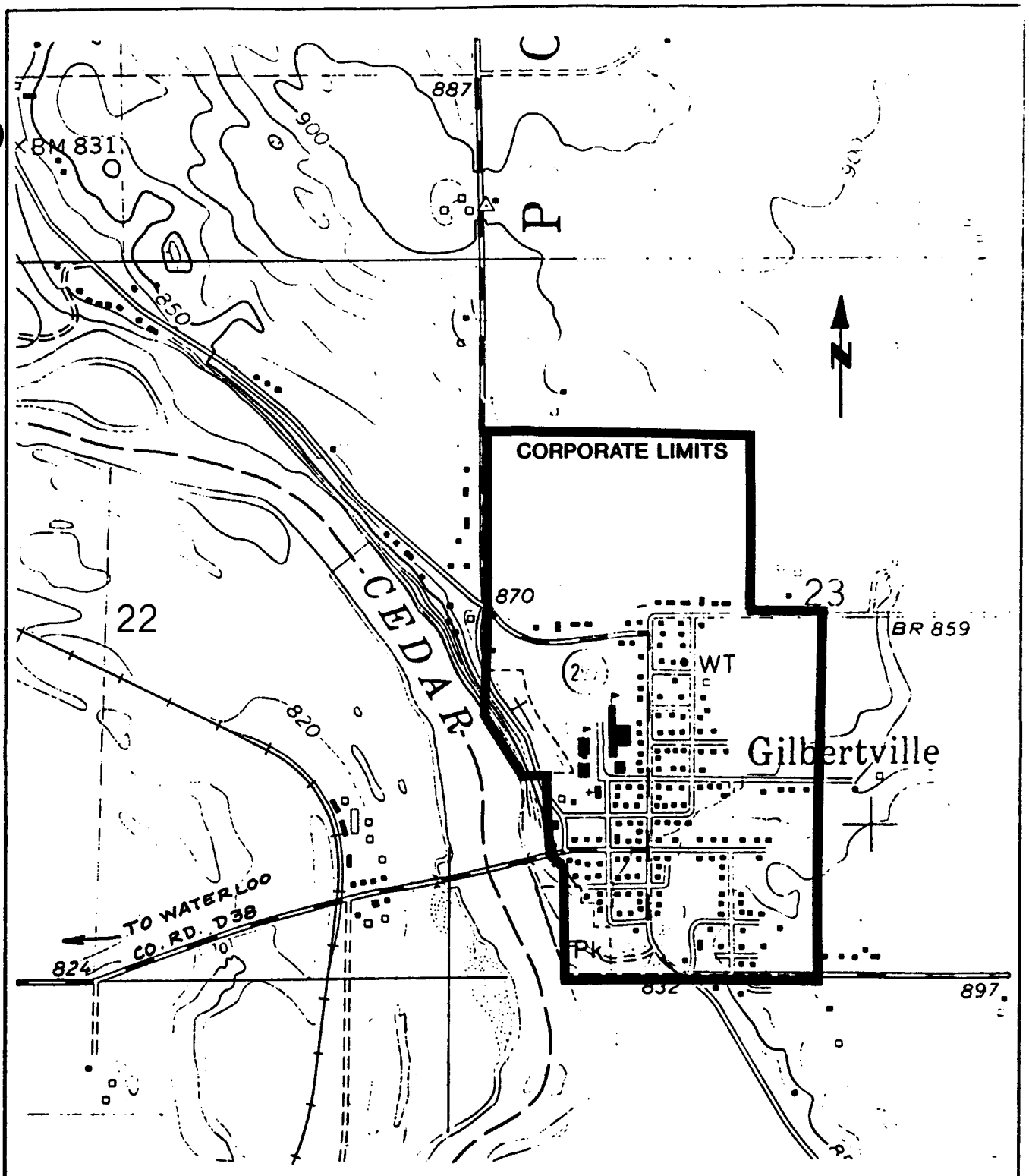
PLATE 6



PLEASANT VALLEY CREEK

DEWAR, IOWA

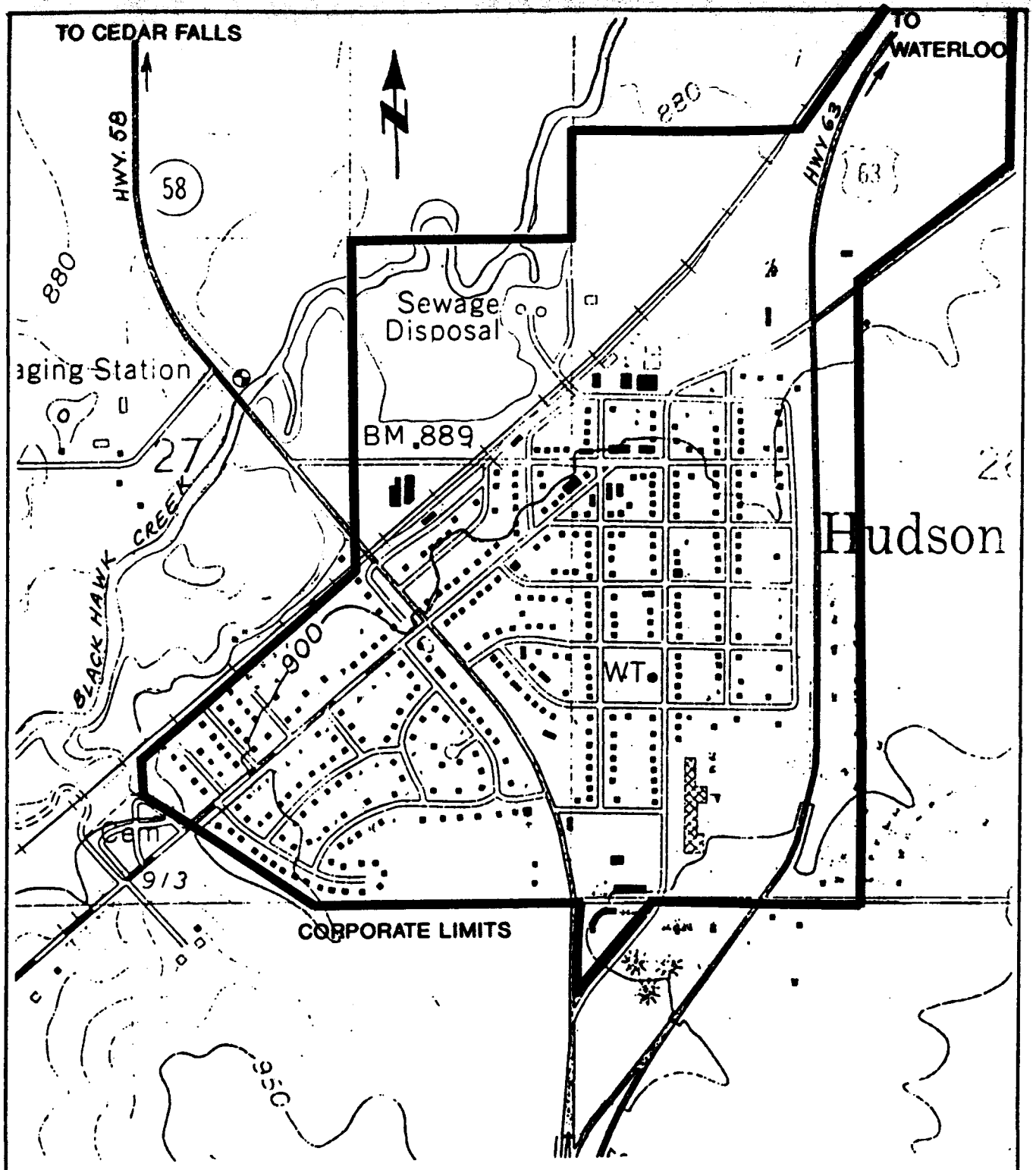
PLATE 7



CEDAR RIVER

GILBERTVILLE, IOWA

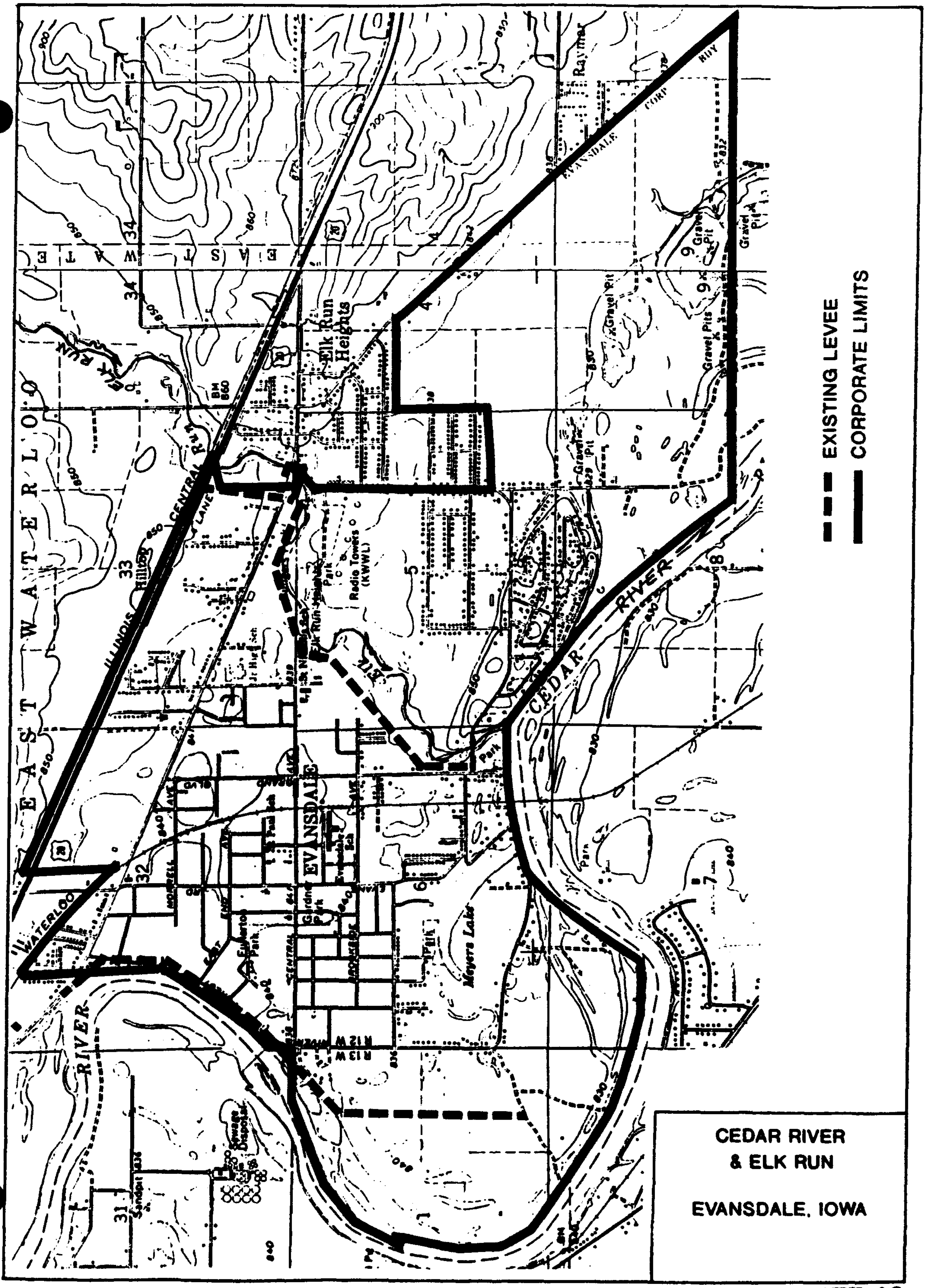
PLATE 8



BLACK HAWK CREEK

HUDSON, IOWA

PLATE 9



CEDAR RIVER
& ELK RUN

EVANSDALE, IOWA

PLATE 10

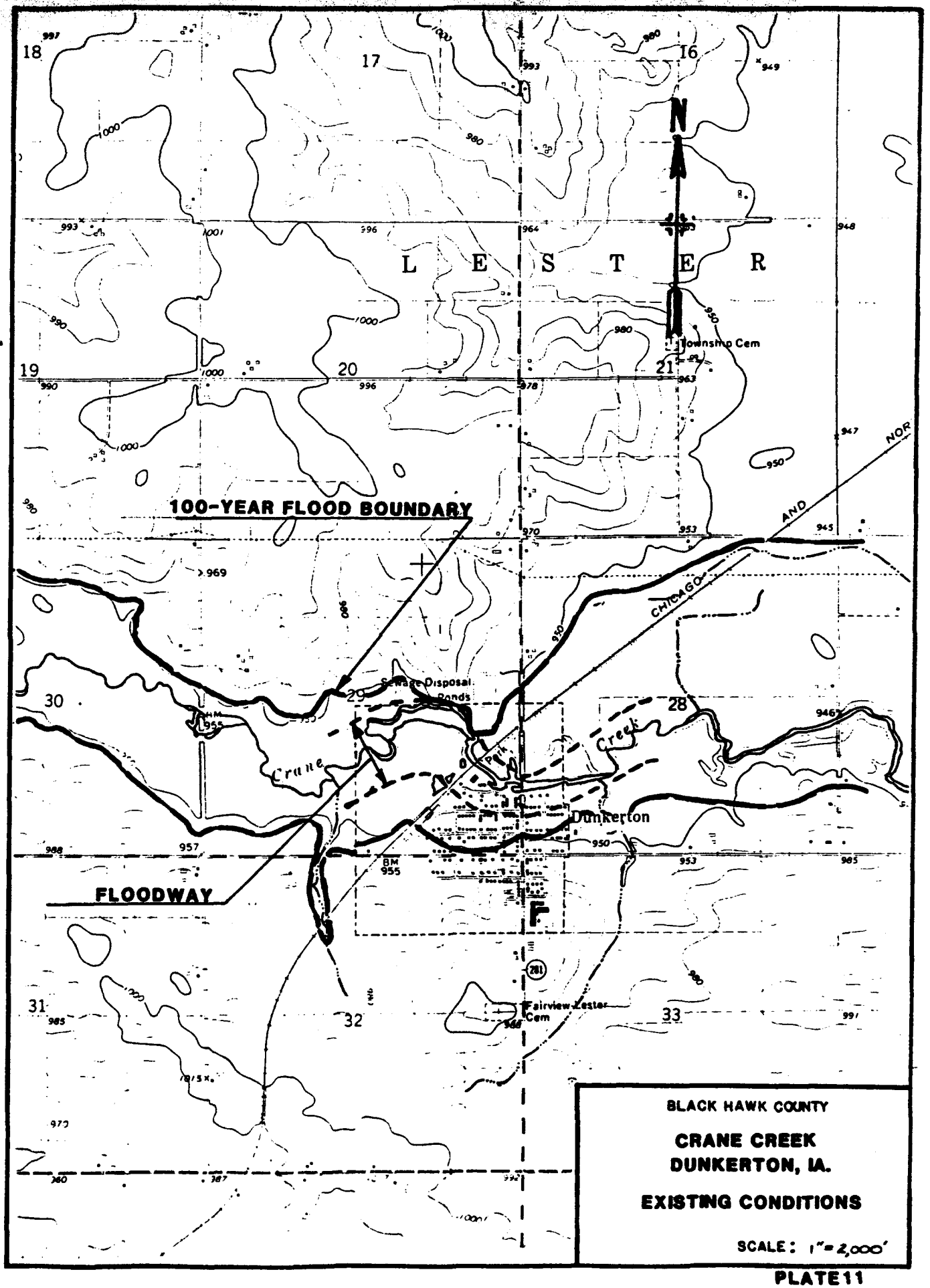
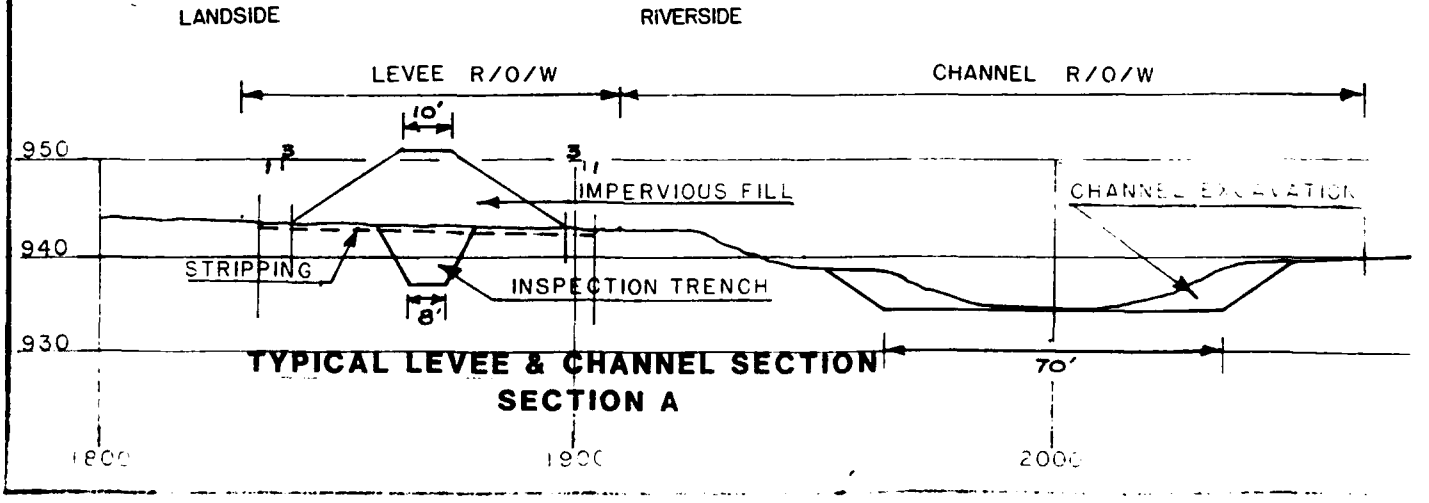
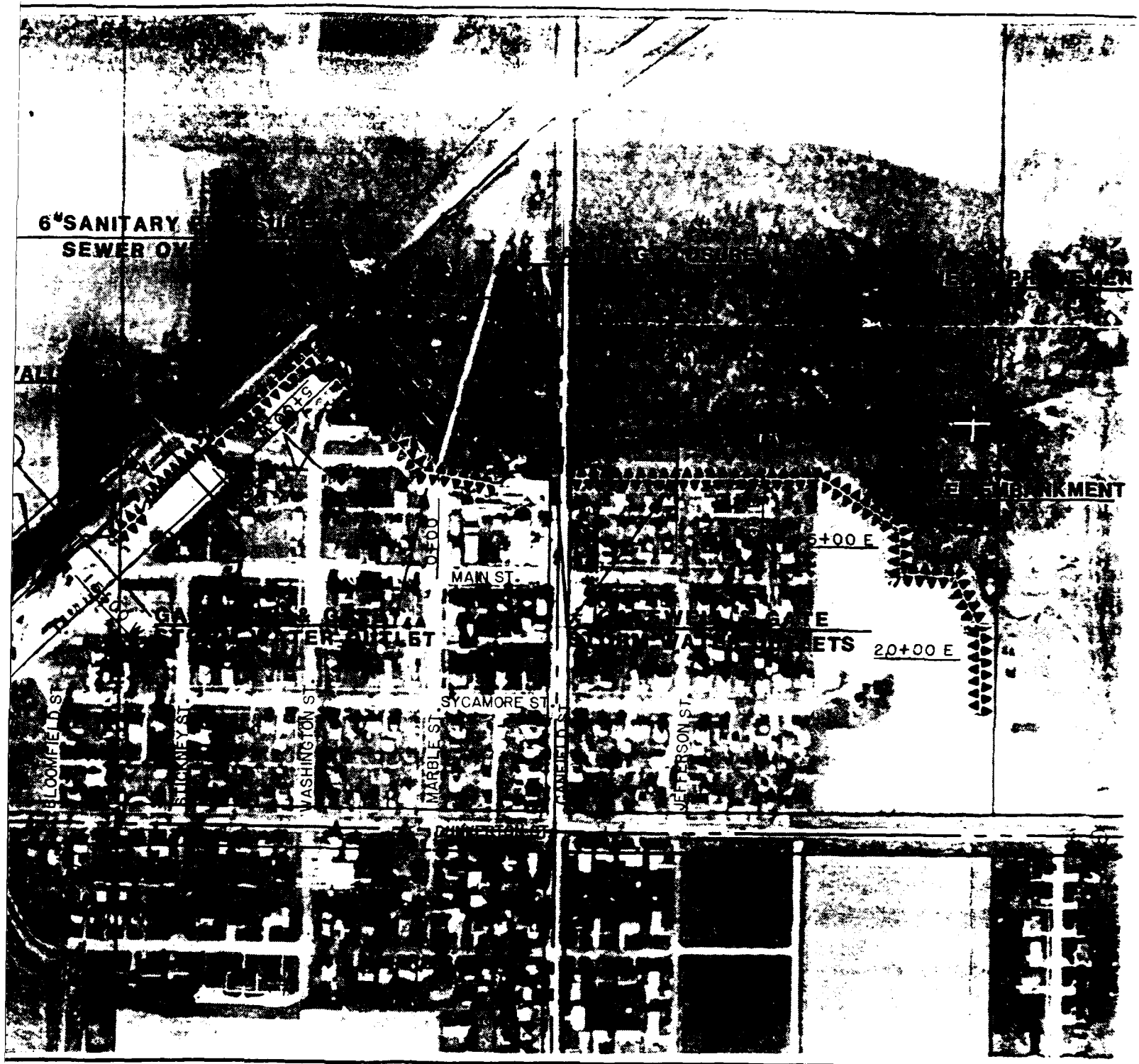

18
17
16
N
L E S T E R
Township Cem
19
20
21
100-YEAR FLOOD BOUNDARY
AND
CHICAGO
30
29
Sewage Disposal Ponds
28
Crane Creek
Dunkerton
BM 955
FLOODWAY
F
31
32
33
Fairview-Lester Cem
BLACK HAWK COUNTY
CRANE CREEK
DUNKERTON, IA.
EXISTING CONDITIONS
SCALE: 1"=2,000'

PLATE 11

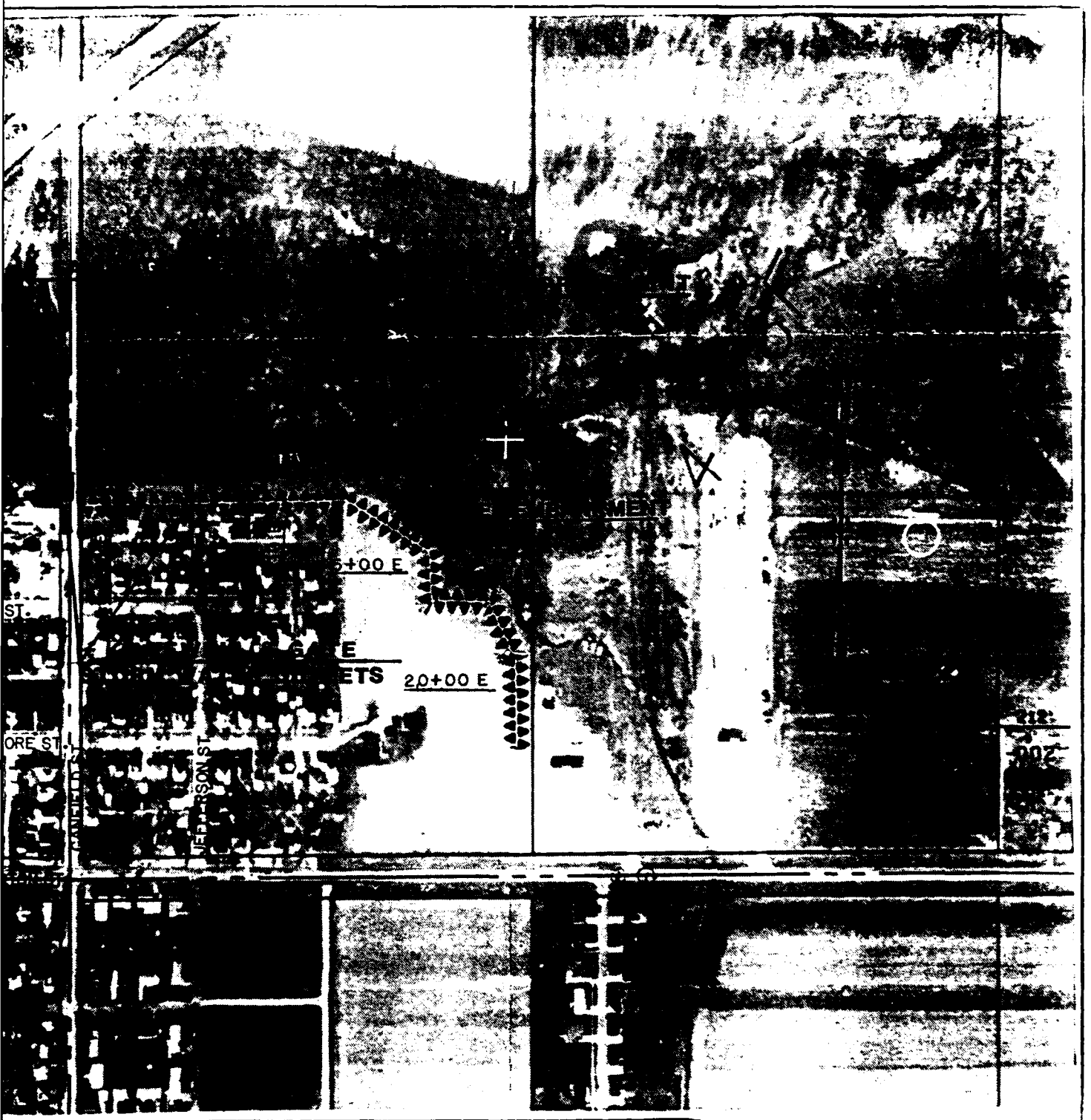


TYPICAL LEVEE & CHANNEL SECTION
SECTION A



TYPICAL CONC. T-WALL
SECTION B

TYPICAL CONC. I-WALL
SECTION C



LANDSIDE

R/O/W

10'

IMPERVIOUS FILL

INSPECTION TRENCH

8'

ICAL CONC. T-WALL
SECTION B

RIVERSIDE LANDSIDE

TYPICAL CONC. I-WALL
SECTION C

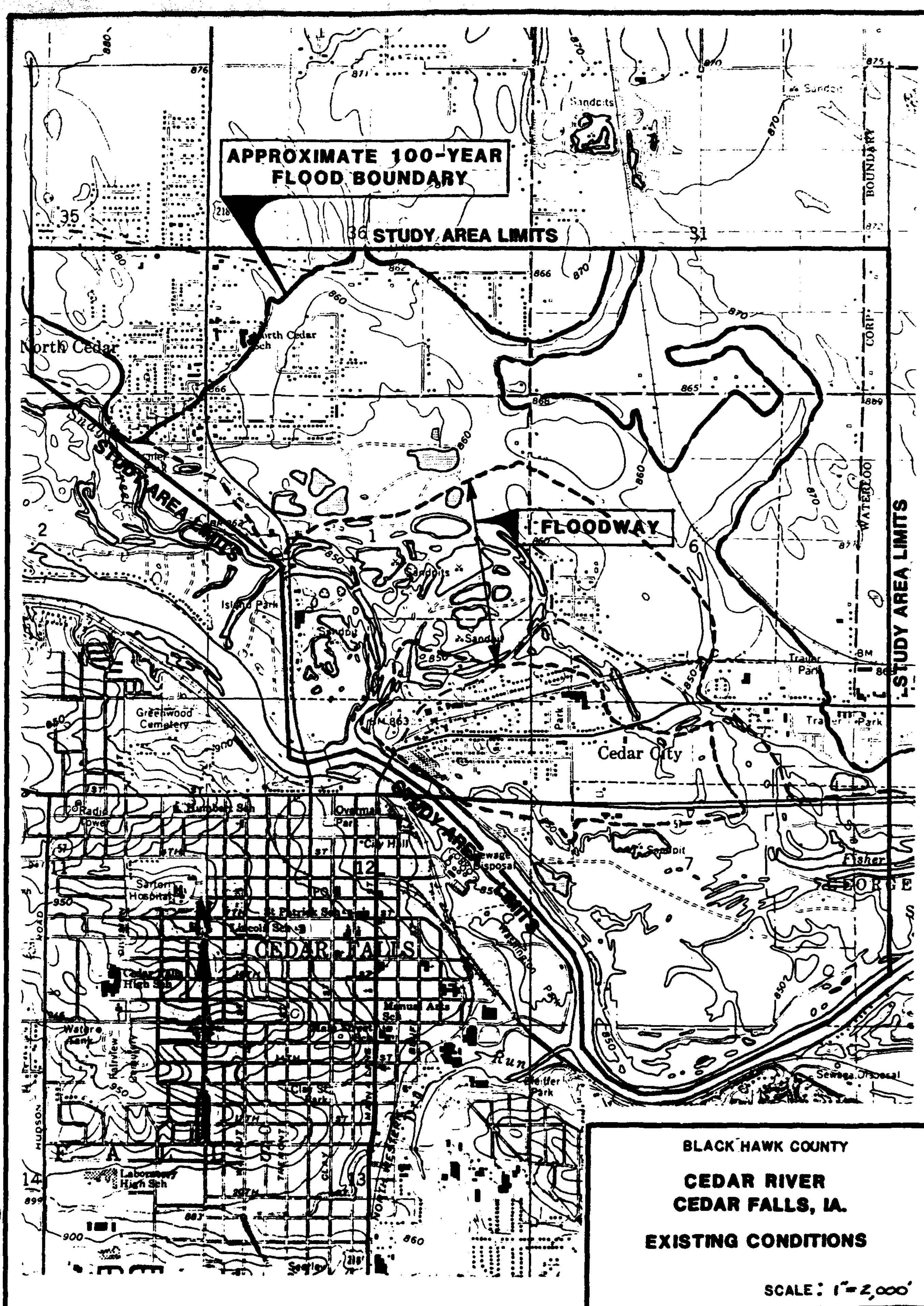
NOTE: GENERAL PLAN 100-YEAR DESIGN

BLACK HAWK COUNTY

CRANE CREEK
DUNKERTON, IA.

GENERAL PLAN

PLAT



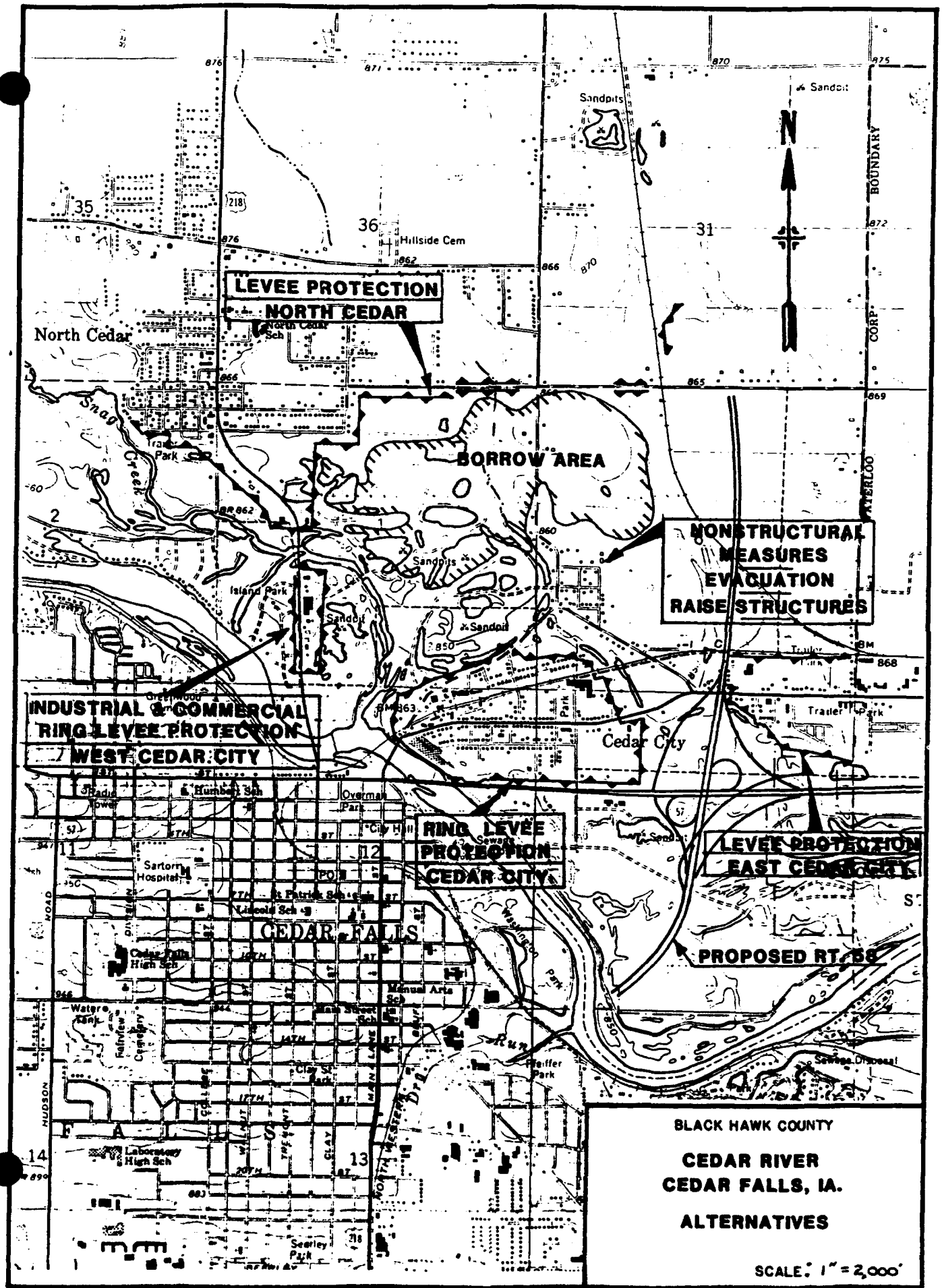
BLACK HAWK COUNTY

CEDAR RIVER
CEDAR FALLS, IA.

EXISTING CONDITIONS

SCALE: 1"=2,000'

PLATE 13



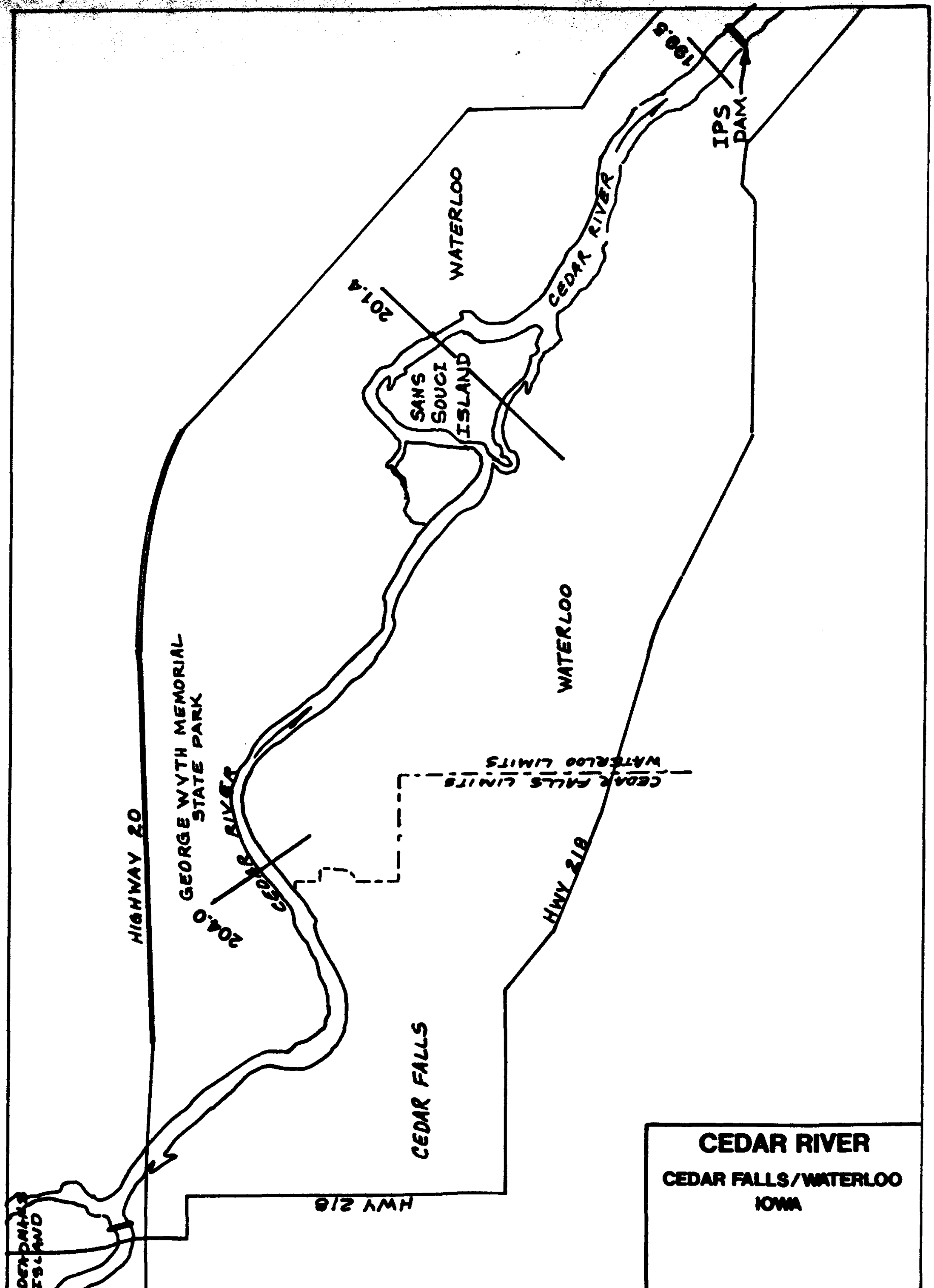
BLACK HAWK COUNTY

CEDAR RIVER
CEDAR FALLS, IA.

ALTERNATIVES

SCALE: 1" = 2,000'

PLATE 14



CEDAR RIVER

CEDAR FALLS/WATERLOO

IOWA

PLATE 15

Cedar River - Waterloo, Iowa
Channel Section Range 199.5

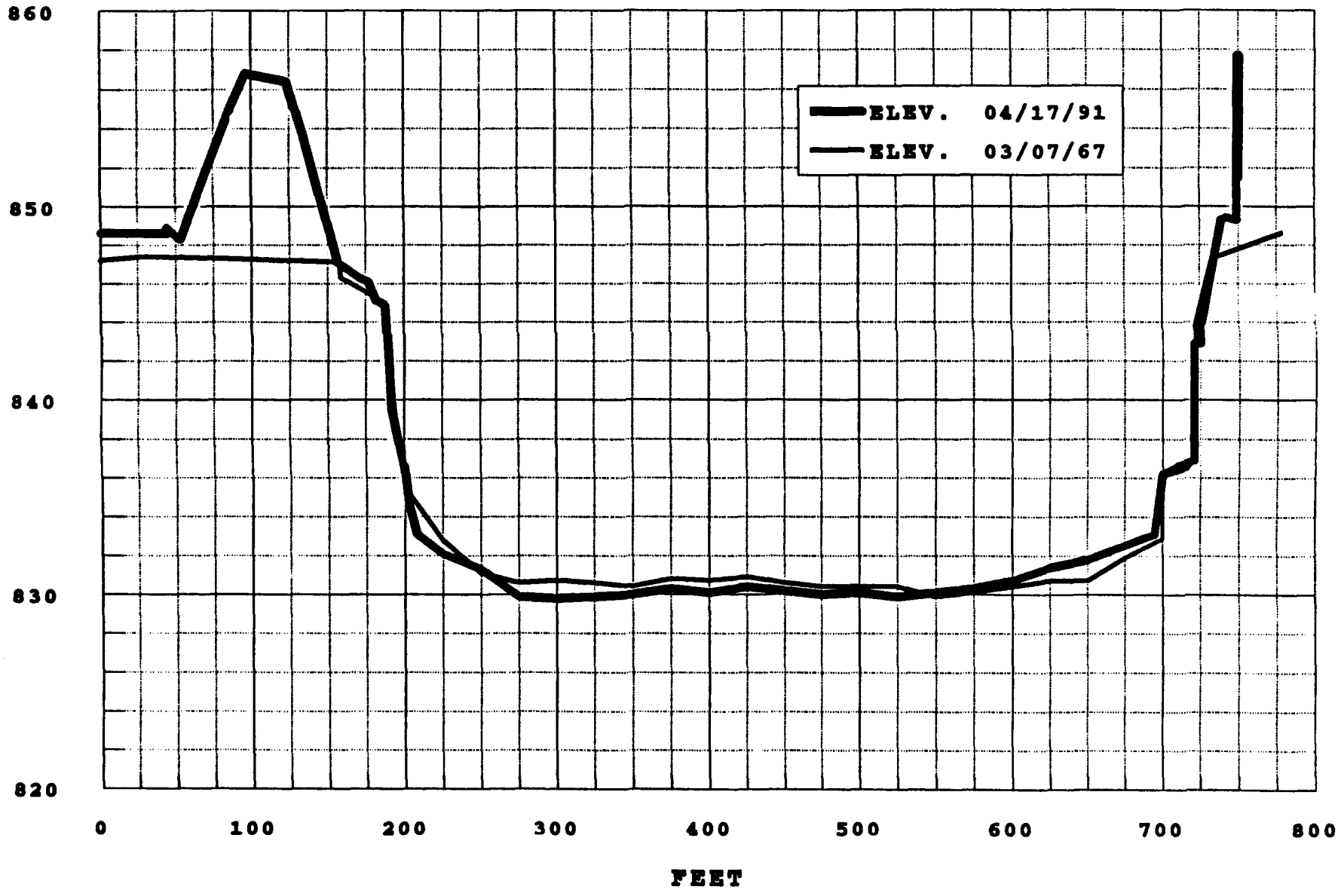


PLATE 16

Cedar River - Waterloo, Iowa
Channel Section Range 201.4

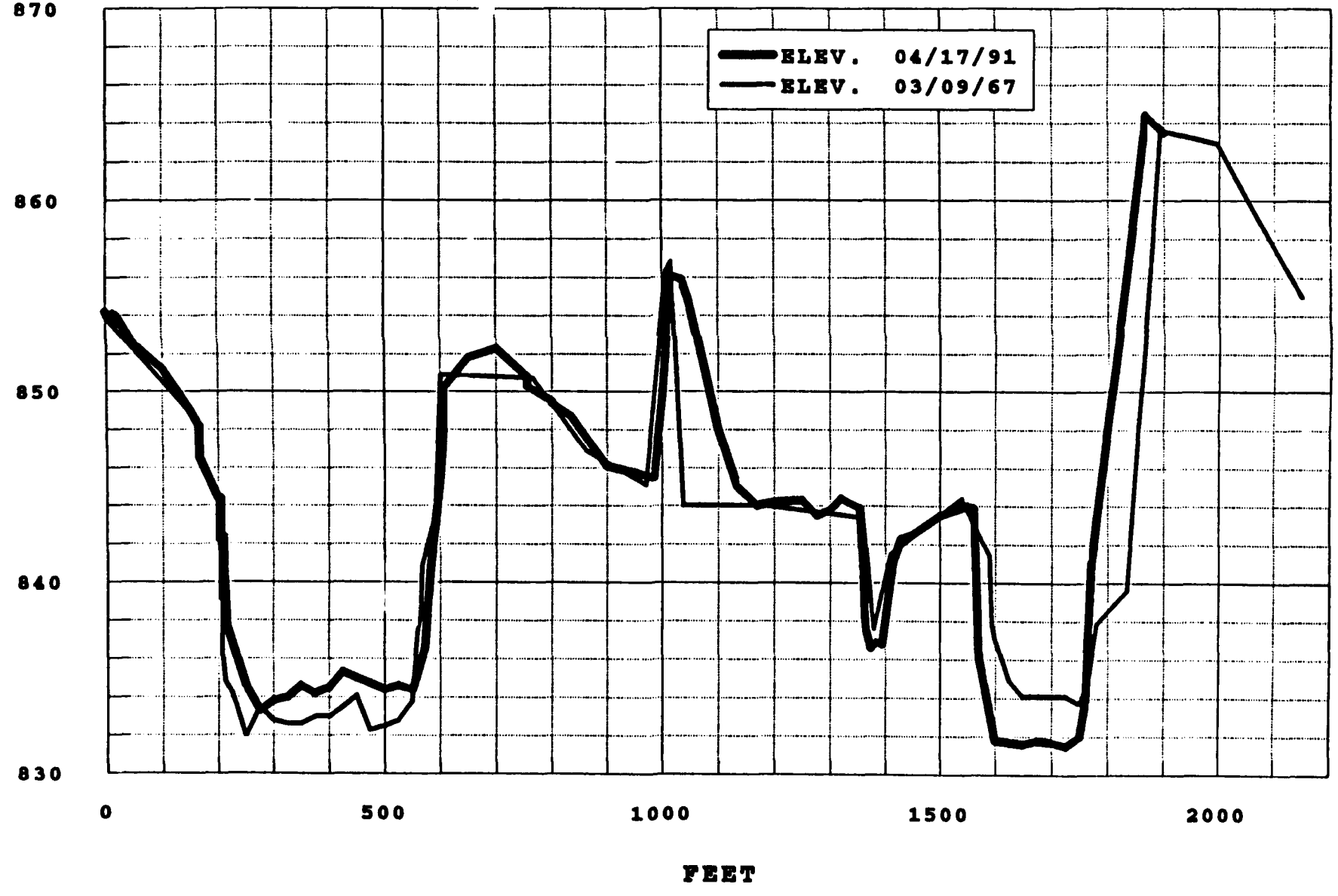


PLATE 17

Cedar River - Waterloo, Iowa
Channel Section Range 204.0

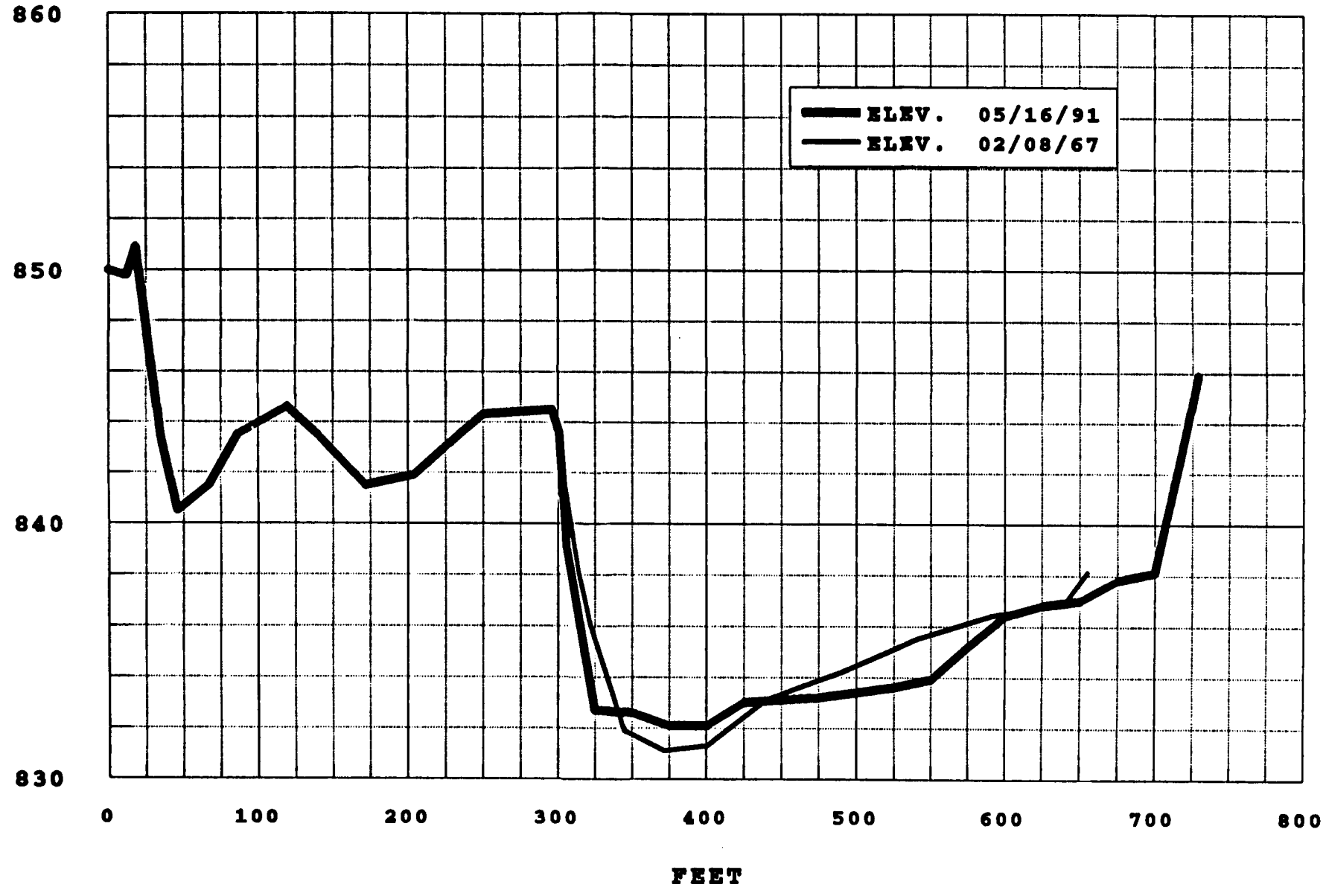


PLATE 18

APPENDIX D1

HYDROLOGY AND HYDRAULICS

APPENDIX A

RECONNAISSANCE REPORT

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

APPENDIX A
HYDROLOGY AND HYDRAULICS

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List of Plates

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CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

APPENDIX A
HYDROLOGY AND HYDRAULICS

SECTION 1 - INTRODUCTION

This appendix discusses several hydrologic and hydraulic analyses undertaken for flood damage reduction and other purposes for the Cedar River drainage area within Black Hawk County, Iowa.

Flood damage reduction investigations include the communities of Dunkerton, Evansdale, Finchford, North Cedar, Cedar City, and Elk Run Heights. The effects of sedimentation on flooding potential of the Cedar River in the Waterloo-Cedar Falls urban area also were investigated and is discussed in the main report.

SECTION 2 - DESCRIPTION OF THE STUDY AREA

WATERSHED CHARACTERISTICS

CEDAR RIVER

The principal stream in Black Hawk County is the Cedar River. The Cedar River, which is already a large stream when it enters Black Hawk County, undergoes a sharp increase in drainage area in the county. Most of this increase in drainage area originates outside Black Hawk County.

The Cedar River near the north (upstream) edge of Black Hawk County has a drainage area of 1,660 square miles; 5,174 square miles at Waterloo; and 5,814 square miles at the southeast (downstream) edge of the county. Plate A-1 shows the peak annual flows at Waterloo since 1929, and table A-1 shows the five highest flood flows at Waterloo.

Stage hydrographs for the two largest floods on the Cedar River at Waterloo are plotted on plate A-2. The river crests in about 3 days. The most rapid rate of rise is estimated at about 8 to 12 feet per day.

TABLE A-1

Major Floods on the Cedar River
at Waterloo, Iowa

Peak Discharge cfs*	Month	Year
76,700	March	1961
69,500	April	1965
65,000	March	1929
61,000	April	1933
58,600	June	1969

* cubic feet per second

BLACK HAWK CREEK

The headwaters of Black Hawk Creek begin in western Grundy County, Iowa. Flow is generally northeast in Black Hawk County, meandering across farm land. The drainage area at the mouth of Black Hawk Creek is 344 square miles; at the gaging station in Hudson the drainage area is 303 square miles. The creek bottom is primarily sand with silt deposits in some areas. Average slope of the creek bottom is about 4 feet per mile in Black Hawk County.

ELK RUN CREEK

Elk Run Creek is an ungaged stream whose drainage area originates entirely within Black Hawk County. The drainage area lies within that region formerly known as the Iowan Drift area, but this terrain is now classified as Pre-Illinoian. Many landscape features once thought to be glacially derived are now recognized as being caused by erosion. As is common with most of Black Hawk County, the watershed area of Elk Run Creek features a mostly mature drainage system. The land use is mainly agricultural. Generally, the watershed is classified as well drained.

CRANE CREEK

A major portion (63.6 square miles out of 109 square miles) of the Crane Creek drainage area lies in southern Bremer County. The drainage of Crane Creek at Dunkerton is approximately 93.2 square miles. The nature of the

drainage area is like that of Elk Run Creek, sharing similar terrain and having similar land use.

WEST FORK CEDAR RIVER

The drainage area of the West Fork Cedar River originates almost entirely outside of Black Hawk County. This drainage area includes portions of Butler, Franklin, and Cerro Gordo Counties and lies completely within the Iowan Drift area. At its mouth, the West Fork Cedar River drains a 2,639-square-mile area. At Finchford, the site of a USGS gage, the drainage area of the West Fork Cedar River is 846 miles. The Shell Rock River joins the West Fork Cedar River approximately 2 miles downstream from Finchford, adding 1,783 square miles of drainage area. About 1.2 miles below this junction, the West Fork Cedar River joins the Cedar River.

CLIMATOLOGY

The principal weather station in Black Hawk County is located at Waterloo. Weather records have been maintained since January 1895 to the present. Plate A-3 shows average high temperatures and low temperatures for each day of the period. Period of record low temperatures showing both the average low temperature and the lowest temperature for the day in period of record are shown on plate A-4.

Period of record high temperatures showing both the average high temperature and the highest temperature for the day in period of record are shown on plate A-5. Plate A-6 shows the maximum rainfall each day over the period of record. The average monthly rainfall is shown on plate A-7.

SECTION 3 - HYDROLOGY

NORTH CEDAR AND CEDAR CITY

Discharges for the North Cedar-Cedar City areas were obtained from a single station analysis of the nearby Waterloo gage. The expected probability adjustment was applied.

The gage (USGS 05464000) at Waterloo, Iowa, has a drainage area of 5,146 square miles and is located at River Mile (RM) 187.9. The first daily readings were recorded in 1940. The period of record used in this report extends through 1985. Estimates for peak discharges on March 16, 1929, and April 2, 1933, also were added, producing 47 systematic events. Expected probability discharges were computed using a Hydrologic Engineering Center program based on *Guidelines for Determining Flood Flow Frequency, Bulletin*

No. 17B (Reference 1). Computations used a generalized skew from a Rock Island District study. This value and other statistics are summarized in table A-2.

TABLE A-2

Systematic Statistics of Analysis for Cedar River Gage at Waterloo, Iowa

Description	Value	Description	Value
Record (in years)	47		
Mean logarithm	4.3607	High outliers	0
Standard deviation	.3425	Low outliers	0
Computed skew	-.7272	Historic events	0
Generalized skew	-.4		
Adopted skew	-.6		

An analysis was made to determine if the period of record should include the years 1986 through 1988. The discharge for the 1 percent chance event using the extended period was only slightly smaller (2 percent). For this reason, the same discharges published in the Cedar Falls Reconnaissance Report (Reference 3) were used in this study.

Peak discharges from the Waterloo gage were multiplied by an adjustment factor before using them at the project site. The site is 1.5 miles upstream from the gage and has a drainage area that is 412 square miles smaller than the gage. The adjustment factors were equal to the drainage area ratio raised exponentially to the area-regression-coefficients listed in Reference 2. The discharge-frequency curves for Waterloo and Cedar Falls are plotted on plate A-8. Table A-3 lists the discharges used in this study.

TABLE A-3

Discharge-Frequency Values Used for Cedar River at Cedar Falls, Iowa

Percent Chance Exceedance	Recurrence Interval (Years)	Peak Discharge (cfs)
50	2	-
20	5	-
10	10	58,000
5	20	-
2	50	89,000
1	100	102,500
0.5	200	115,000
0.2	500	131,500

WATER SURFACE PROFILES

Model Description and Assumptions

Water levels for the project were calculated with the HEC-2 Water Surface Profile Computer Model (Reference 4). The input file was made originally to compute flood insurance profiles at Cedar Falls. The model starts at section 204.1, which is 10,800 feet downstream of the I.C. Railroad bridge. The starting cross section and other key locations are shown on plate A-9.

Starting water surface elevations were based on values from the flood insurance study (Reference 5). Flood insurance stages and discharges at section 204.1 were plotted to make a rating curve. Then, stages corresponding to the discharges in table A-2 were obtained from the rating curve and used to start HEC-2 computations.

The HEC-2 model contains about 69 cross sections; 34 cross sections model the Cedar River from RM 204.1 to RM 210.8. The channel "n" value up to the project is 0.025; overbank "n" values range from 0.12 to 0.085. Contraction and expansion coefficients are .1 and .3, except through bridges where they increase to .3 and .5.

Several changes were made to the original flood insurance data deck before it was used in this study. Brice Petrides-Donohue altered the deck in 1990 to model Iowa Department of Transportation interstate highway improvements. The Main Street bridge was removed from the data deck in this study to reflect the removal of the deck and piers by the city of Cedar Falls in 1990.

The other 25 cross sections model a flow diversion that leaves the main channel at RM 204.1 and returns to the main channel at RM 206.16. The discharges in this reach were proportioned using divided flow analysis techniques.

TABLE A-4

Divided Flow Used for Cedar River at Cedar Falls, Iowa

Percent Chance Exceedance	Main Channel (cfs)	Total Discharge (cfs)
10	57,000	58,000
2	70,500	89,000
1	79,000	102,500
0.2	95,000	131,500

Ice jams occur during spring breakup. However, city personnel cannot recall either ice or debris blocking bridges during major floods. Therefore, full bridge openings were used.

Model Results

Cedar River profiles for the 10-, 2-, 1- and 0.2-percent chance exceedance frequency events appear on plate A-10.

INTERIOR DRAINAGE

A preliminary interior drainage analysis was undertaken and is subject to more detailed analysis and field verification. Interior drainage is important to the preliminary design of flood damage reduction measures because the Cedar River can remain at high stages for several days.

North Cedar

The preliminary levee alignment intercepts a large drainage area of 11.25 square miles. Normally, substantial interior drainage facilities would be required. However, little runoff occurs from this area because the soil is extremely sandy and precipitation is readily absorbed. The largest stream is an unnamed intermittent creek which originates in the extreme northeastern edge of the basin, flows southerly approximately 3 miles, and ends in the vicinity of sand pits 1.5 miles northeast of the North Cedar. None of this drainage appears to reach the line of protection. Near the levee, existing drainage is dominated by the presence of former oxbow lakes. The bulk of this area is served by a drainage ditch with a 60-inch-wide concrete invert which empties into a drainage canal.

During high water, seepage will occur because of the sandy soil. Total seepage is estimated to be about 6,800 gpm based upon 0.1 gpm per foot of levee per foot of head. This rate is a nominally high rate generally applied to sand levees with deep sand foundations. The proposed North Cedar levee is about 8,500 feet long with an average head of 8 feet. Seepage removal can be accomplished by using temporary 5,000 gpm pumps downstream of Highway 218 and at the low area west of Big Woods Road.

Gatewells would be required on existing drainage structures; a 72-inch gatewell on the drainage ditch discussed above and twin 42-inch gatewells on existing storm sewers at the west end of Clair Street near Snap Creek. Ponding areas needs are met by borrow requirements. No ditching is needed since the affected structures are at least 2 feet above low areas. This is more than required to allow ponded seepage to reach the temporary pumps.

Seepage trapped in isolated areas will drain into the sandy soil as soon as the river falls.

Cedar City

Under the current plan, Cedar City would be protected by two ring levees, discussed separately as "west" and "east."

Cedar City-West. Cedar City-West has a confined drainage area of 157.7 acres. As with the North Cedar, the soil is quite sandy. However, because of the high density of development, sufficient ponding should be provided to store 1.0 inch of runoff plus 12 hours of peak seepage.

Runoff of 1.0 inch requires 13.1 acre-feet. Peak seepage is estimated to be about 15,700 gpm based upon 0.1 gpm per foot of levee per foot of head. This rate is a nominally high rate applicable to sand levees with deep sand foundations. The levee is 11,200 feet long and the average head was taken to be 14 feet. This rate of seepage over a 12-hour period will amount to a volume of 35 acre-feet. Total required ponding volume is 48.1 acre-feet which is about the volume developed by borrow requirements.

Temporary pumping facilities of at least 15,700 gpm are required at an existing 48-inch RCP under Highway 20 west of Roosevelt Street, including a 48-inch gatewell. Size and condition of culvert need to be field verified.

A 10-foot-wide ditch is required carrying a flow of approximately 25 cfs between the ponding area in the southeast corner of the protected area and the above gatewell. Slope should be 0.5 percent or greater. Elevation of the ground assures a depth of at least 3 feet.

A peak runoff of 26 cfs would occur if this sandy area produced 2 inches of runoff in an hour with the ponding area already filled. The existing 36-inch RCP can pass this flow with a head of 0.8 foot. This head is available. It is noted that this gatewell empties into an existing 8-foot by 8-foot box culvert. This is because the proposed levee will cut off much of the flow to the existing culvert.

Cedar City East. Cedar City-East has a confined drainage area of 68.8 acres. The soil is silty. As above, because of the high density of development, sufficient ponding should be provided to store 1.0 inch of runoff plus 12 hours of peak seepage. Runoff of 1.0 inch requires 5.6 acre-feet. Peak seepage is estimated to be about 3,600 gpm, based upon 0.1 gpm per foot of levee per foot of head. The levee is 2,600 feet long and the average head was taken to be 14 feet. This rate of seepage over a 12-hour period will amount of a volume of 8.1 acre-feet. Total required ponding volume is 13.7 acre-feet.

Temporary pumping facilities of at least 3,600 gpm are required at the proposed ponding outlet on the south end of the project.

Minor ditching to assure drainage should be provided as a field adjustment.

If this silty area produced 3 inches of runoff in an hour with the ponding area already filled, a peak runoff of 17 cfs would occur. A 36-inch RCP can pass this flow with a head of 0.6 foot. A 36-inch gatewell would be required. Because of sensitivity to stage increases, a smaller outlet is not recommended.

DUNKERTON

In June 1990, major flooding from Crane Creek occurred in the city of Dunkerton, with up to 5 feet of water flowing along Lincoln and Main Streets. The floodplain within Dunkerton is administered on the basis of floodway mapping published January 16, 1980, by the Federal Emergency Management Agency. This publication shows the floodway alignment generally following Main Street, a distance of 400 to 500 feet from the left bank of Crane Creek.

Flood heights were computed using the program HEC-2, "Water Surface Profiles," released by the Hydrologic Engineering Center at Davis, California, September 1990. Flood height analyses were based upon 1979 Federal Insurance Administration data verified by field inspection. Manning's "n" roughness coefficients were 0.040 for the channel, and roughness coefficients for overbank areas varied from 0.08 to 0.10. Contraction and expansion coefficients were 0.3 and 0.5, respectively. The Special Bridge routine was used to model the Chicago and North Western Railway bridge, the Marble Street bridge, and the Canfield Road bridge within the city of Dunkerton.

Crane Creek reacts rapidly to heavy rainfall. Residents have reported that flooding can occur "overnight," and hydrologic investigations support this. The computed Clark's time of concentration for the Crane creek basin is about 9 hours. An HEC-1 analysis was performed on the 93.2-square-mile basin using a Clark's time of concentration of 9 hours, a Clark's R of 6 hours, and fourth quartile rainfalls with a 12-hour duration. The resulting 1 percent annual exceedency event is shown on plate A-11. As shown on the plate, the 100-year flow would increase from 1,000 cfs to 10,000 cfs in about 6 hours.

Under the worst case situation (i.e., the Crane creek basin experiencing 3 inches of runoff in 1 hour), flooding would occur in about 3 hours. Under more usual runoff conditions, flooding would occur in about 6 to 8 hours.

Structural flood damage reduction alternatives were considered for Dunkerton. The most economical appears to be a combined channel

improvement and levee. Channel improvement was almost a mandatory consideration since the existing floodway alignment follows Main Street in much of the city. Channel improvement is required in order to relocate the floodway alignment closer to the stream. Without channel improvements, Main Street likely would be the site of proposed structural measures, which would exclude a portion of the city from flood damage reduction.

The 1979 FIS HEC-2 backwater model was modified as follows. The left encroachment limit was moved 400 to 500 feet riverward from Main Street to the left bank of Crane Creek, and a trapezoid channel improvement was installed. The channel improvement used 3 on 1 side slopes and a channel with both 70- and 90-foot bottom widths. No existing bridges were improved.

For the improved channel, a Manning's roughness coefficient "n" of 0.035 was selected. This is compared to Manning's roughness coefficients of 0.030 for a typical excavated channel and 0.040 that was used in the original backwater model and verified in the field. The selected "n" value of 0.035 reflects the improved channel with average maintenance. As of November 1990, the channel was severely shoaled from the June 1990 floods, illustrating how a single event can significantly impede the performance of the improved channel. The 50- and 100-year flood profiles with channel modifications are shown on plates A-12 and A-13, respectively.

Using profile information, stage-frequency curves were developed at the Canfield Road bridge, the Marble Street bridge, and the railroad bridge at the upstream boundary of Dunkerton. These curves are shown on plates A-14, A-15, and A-16, respectively. It is noted that the improved channel profiles are higher than the existing because the channel improvement is accompanied by moving the town side encroachment limit 400 feet to the bank of Crane Creek. As stated above, the channel improvements and encroachment limit revisions were necessary for the proposed levee. The encroachment limits formerly coincided with the centerline of Main Street.

Profiles also were computed on the basis of removing the abandoned road embankment abutting the flow-constricting Marble Street Bridge. Negligible benefits were attained. If the removal of the abandoned road were the only improvement, the 100-year flood event would be lowered approximately 0.1 foot. If a 90-foot-wide channel improvement were in place, the 100-year event would be lowered approximately 0.3 foot. These decreases are not of sufficient magnitude to warrant removing the embankment. Removing the entire bridge would lower the profiles a maximum of 0.6 foot. Therefore, this alternative was not considered further.

Incorporation of probable upstream floodway mitigation was not pursued in detail at this time. This results from the relocation of the encroachments from Main Street to the Crane Creek stream bank. Despite a major channel improvement, this encroachment relocation results in an increase of 1.8-foot rise above existing profiles. The original floodway encroachment limits were intended to administer a maximum of 1.0 foot of increase in

stage. The extra 0.8-foot increase above the regulated 1.0-foot increase in stage would require mitigation.

Interior drainage facilities required for the preliminary plan would appear to be minimal. The entire contributing area is only 220 acres, 67.7 acres of which is diverted around Dunkerton above the levee tie-off. The remaining 152.3 acres of contributing area includes approximately 60 acres of developed lowland adjacent to the preliminary plan. Since Crane Creek does not experience prolonged high water, no ponding or pumping appears to be necessary to reduce interior stages. Interior drainage facilities would be limited to providing gatewells on existing storm sewers which enter Crane creek under the levee. Gatewells would be required for a 42- by 72-inch concrete arch storm sewer near Marble street, a 27-inch metal storm sewer at Canfield Road, and a 24-inch RCP at Jefferson Street.

FINCHFORD

Hydraulic and hydrologic investigations were performed on a limited basis since it appeared that flood damage reduction benefits were not sufficient to support Federal participation. Investigations did include deriving a revised frequency curve to include the record stage-producing event of June 1990. The Fort Dodge office of the U.S. Geological Survey accomplished the flow assignment for the June 1990 event. While the stage was a record high, the flow that produced it was not. This is because the June 1990 flood occurred after 2 years of drought, and, during these 2 years, the channel and floodway of the West Fork Cedar River became heavily vegetated. The vegetation hindered the flow of water, essentially roughening the channel and causing atypically higher flood stages. This phenomena was observed on several other streams in Iowa at this time. The frequency curve is shown on plate A-17.

EVANSDALE

A Corps of Engineers levee was constructed in 1982 along the right bank of Elk Run Creek in Evansdale. Modifications to the interior plan were undertaken in 1984. The city of Evansdale requested that flood damage reduction be investigated for the left bank of Elk Run Creek. Since the levee along the right bank of Elk Run Creek was designed assuming confinement on both sides of the creek, any structural flood damage reduction measures considered for the left bank will not alter the existing profiles of Elk Run Creek.

ELK RUN HEIGHTS

Technical assistance was provided concerning localized flooding in the Shirley Subdivision arising from largely agricultural drainage of about 1 square mile. Several recommendations on dealing with the flooding were presented to the community by letter dated November 19, 1990 (see appendix E).

REFERENCES

1. U.S. Water Resources Council, Bulletin 17B, *Guidelines for Determining Flood Flow Frequency*, March 1982.

2. Iowa Natural Resources Council, Bulletin No. 11, *Floods in Iowa: Technical Manual for Establishing Their Magnitude and Frequency*, March 1973.

3. *Reconnaissance Report Section 205 Flood Control Project Cedar Falls, Iowa*, U.S. Army Corps of Engineers Rock Island District, June 1988.

4. *HEC-2 Water Surface Profiles*, U.S. Army Corps of Engineers Hydrologic Engineering Center, Davis, California, May 1984.

5. *Flood Insurance Study, City of Cedar Falls*, Iowa, Federal Emergency Management Agency, August 1984.

6. *Training Document No. 18 Applications of the HEC-2 Split Flow Option*, Hydrologic Engineering Center, Alfredo Montalvo, Davis, California, April 1982.

BLACK HAWK COUNTY
PEAK ANNUAL FLOWS AT WATERLOO

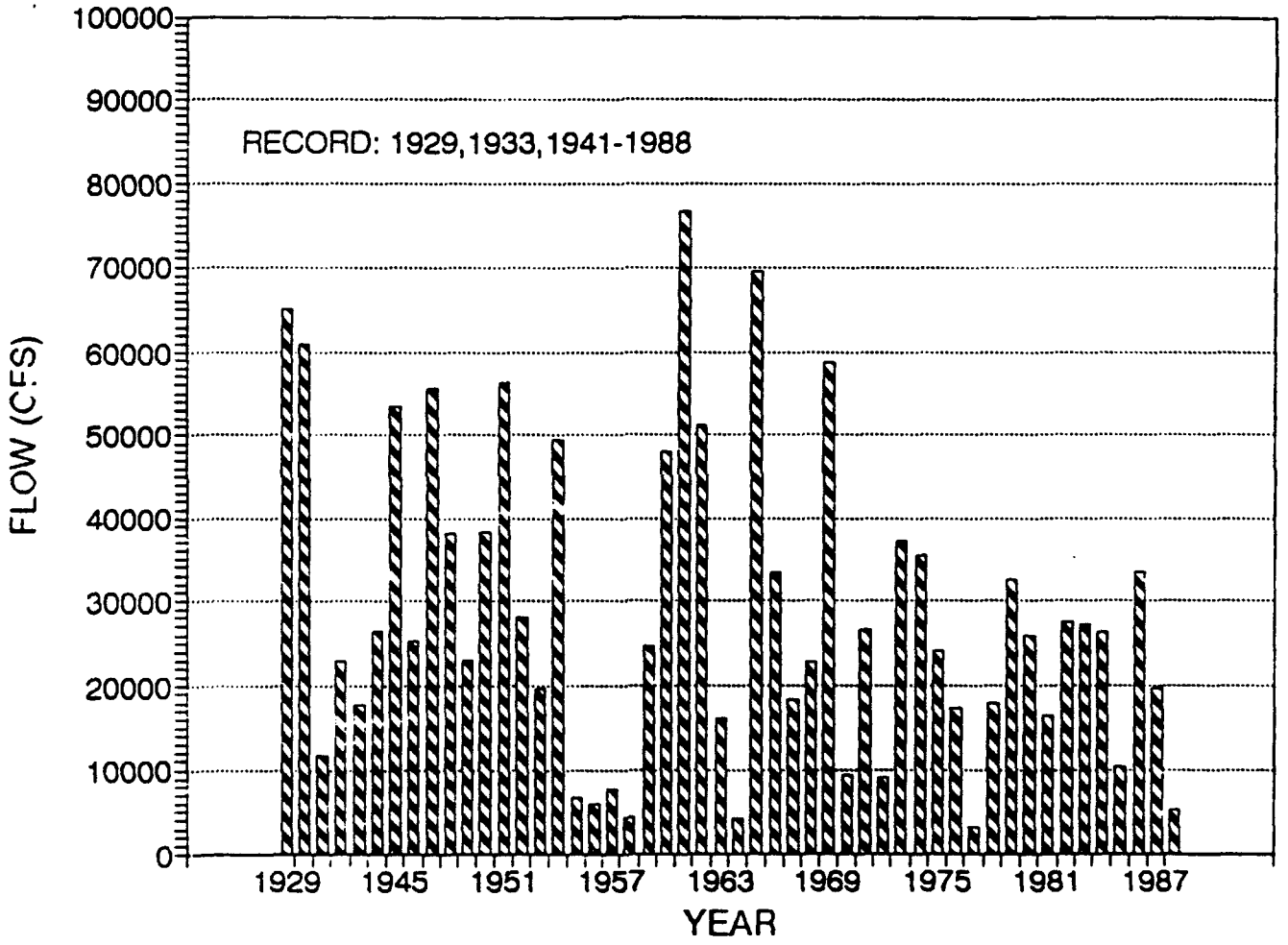
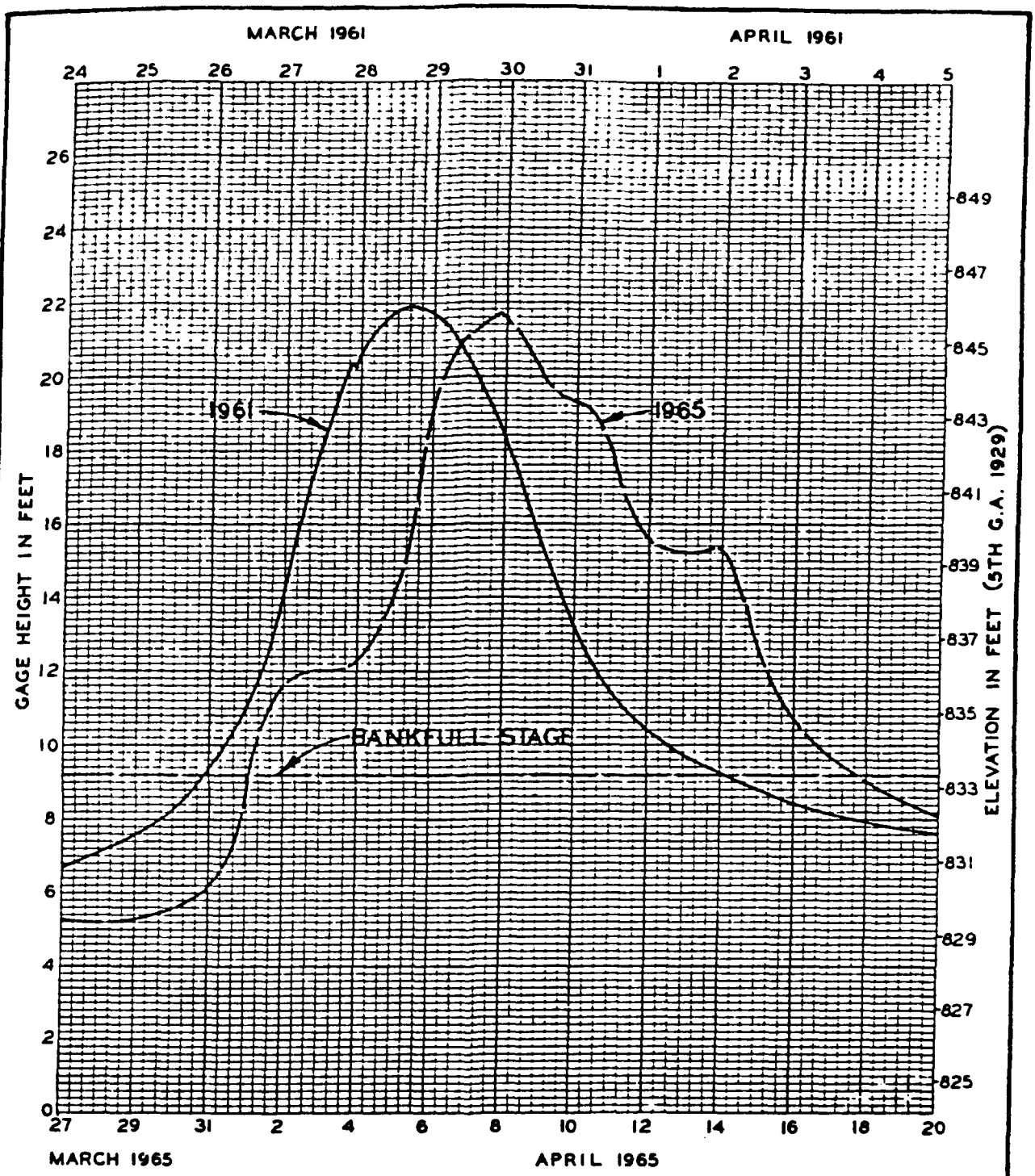


PLATE A-1



RIVER GAGE AT MILE 199.15

ZERO OF GAGE- ELEVATION 824.14

CORPS OF ENGINEERS, U.S. ARMY

ROCK ISLAND, ILLINOIS, DISTRICT

STAGE HYDROGRAPHS

CEDAR RIVER

WATERLOO, IOWA

PLATE A-2

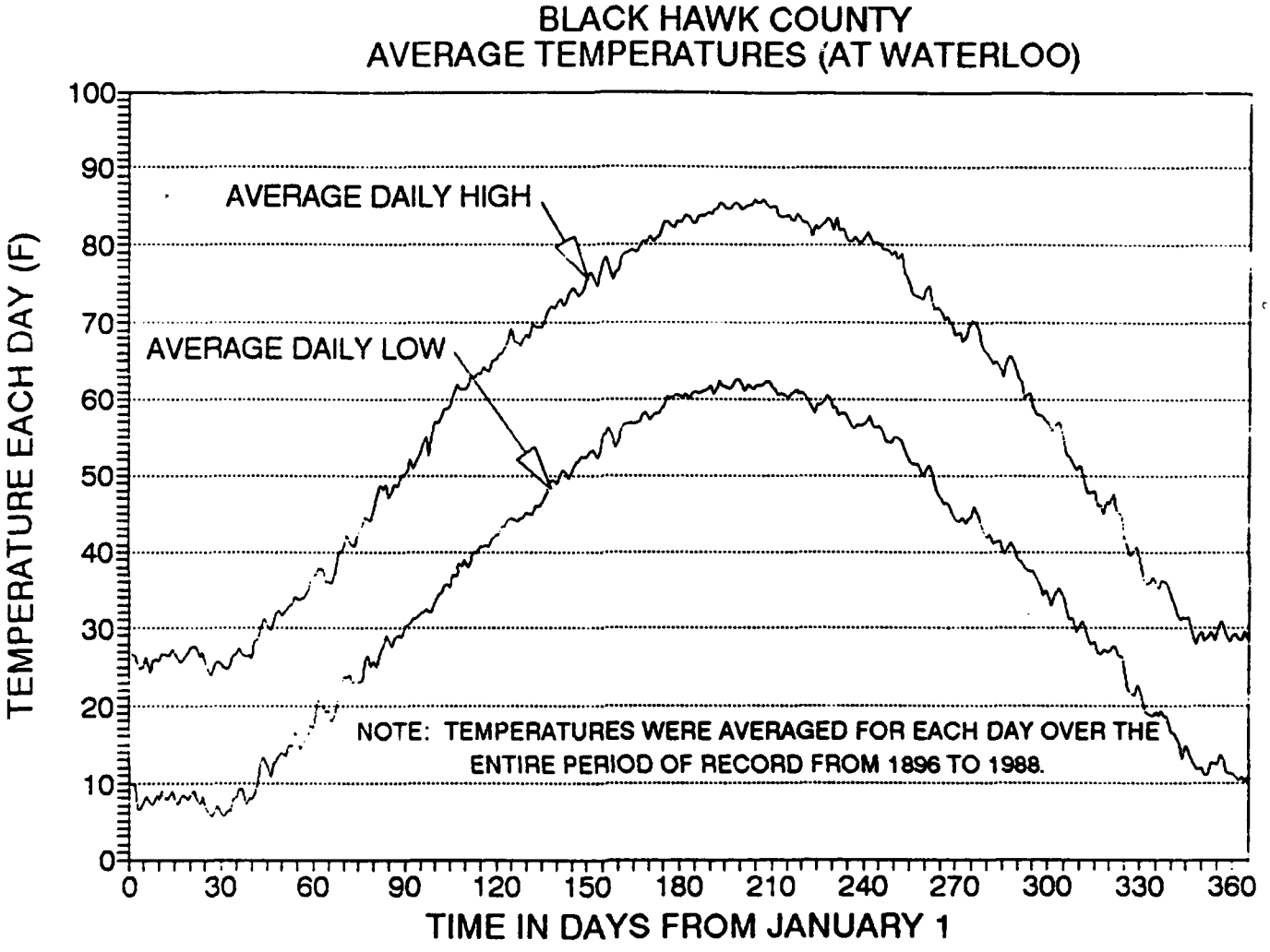

BLACK HAWK COUNTY
AVERAGE TEMPERATURES (AT WATERLOO)
TEMPERATURE EACH DAY (F)
100
90
80
70
60
50
40
30
20
10
0
AVERAGE DAILY HIGH
AVERAGE DAILY LOW
NOTE: TEMPERATURES WERE AVERAGED FOR EACH DAY OVER THE ENTIRE PERIOD OF RECORD FROM 1896 TO 1988.
0
30
60
90
120
150
180
210
240
270
300
330
360
TIME IN DAYS FROM JANUARY 1

PLATE A–3

BLACK HAWK COUNTY
PERIOD OF RECORD LOWS AT WATERLOO

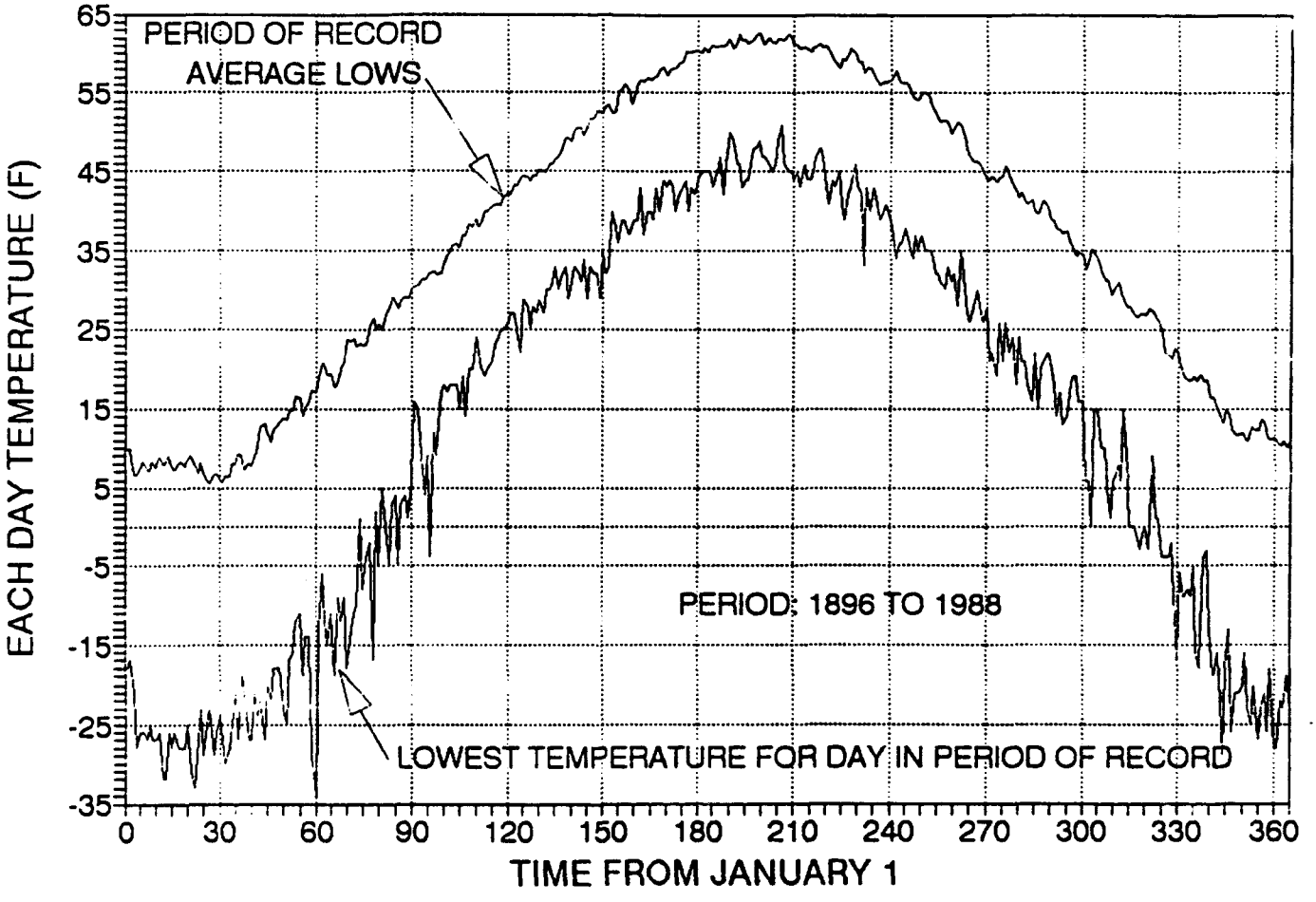


PLATE A-4

BLACK HAWK COUNTY
PERIOD OF RECORD HIGHS AT WATERLOO

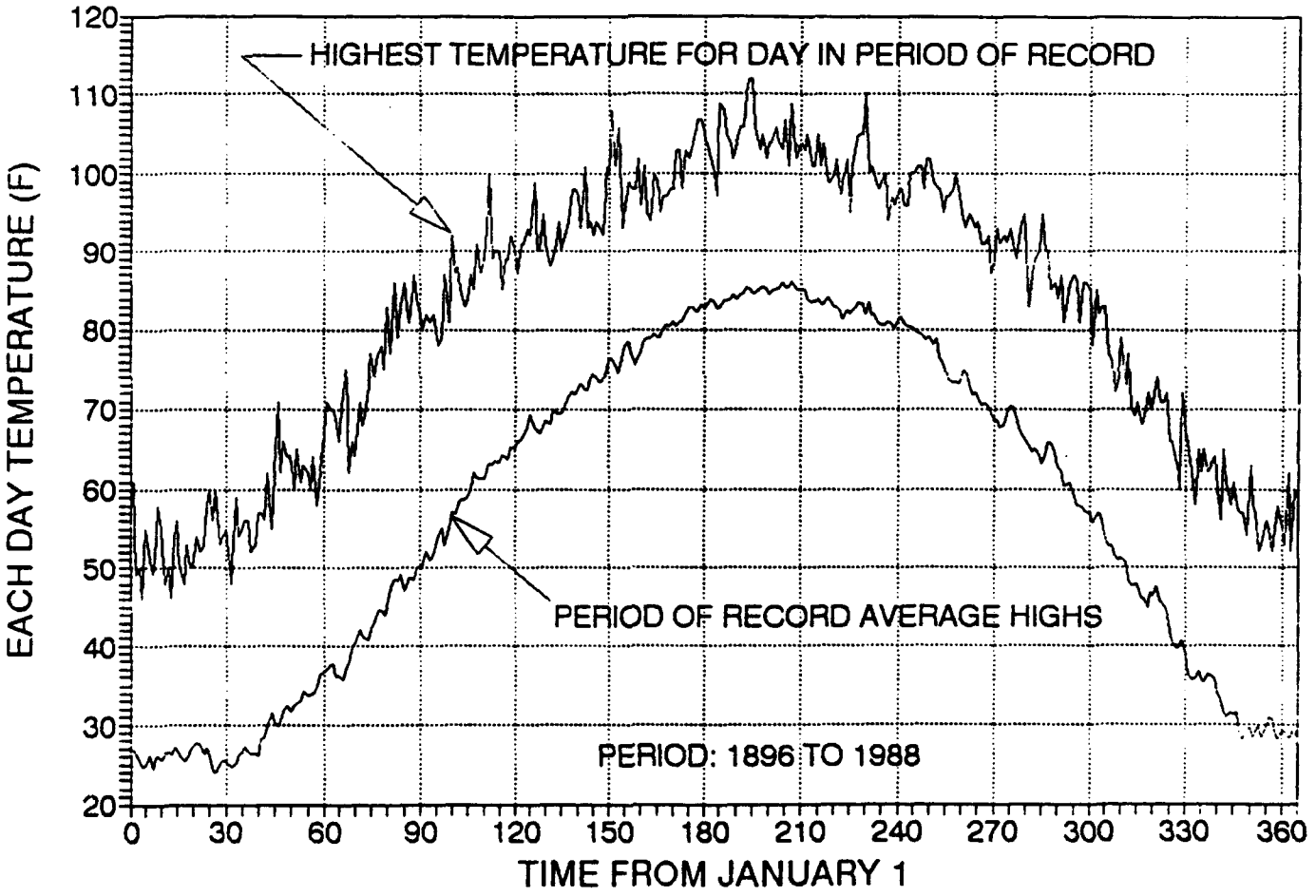


PLATE A–5

BLACK HAWK COUNTY
MAXIMUM DAILY RAINFALLS AT WATERLOO

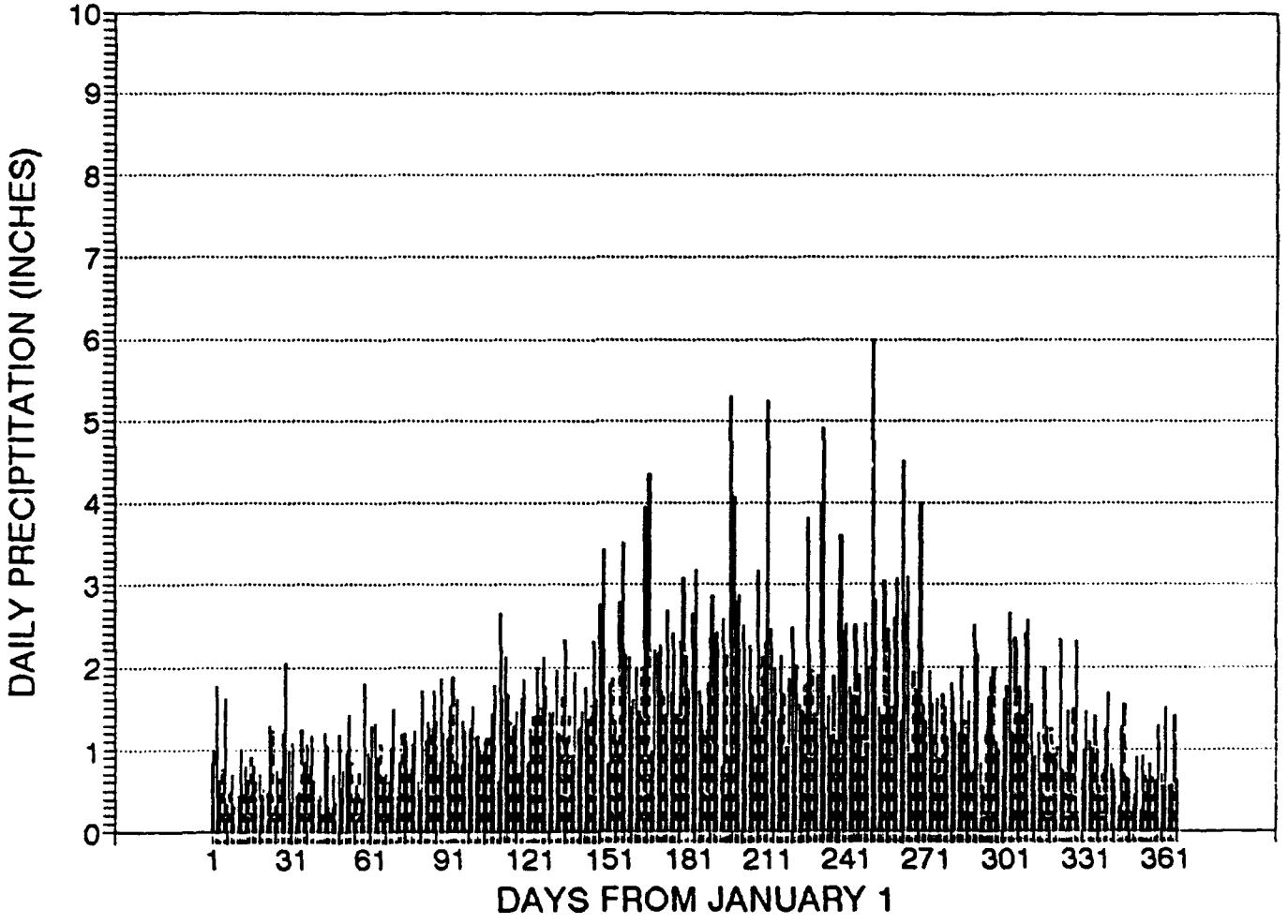


PLATE A-6

BLACK HAWK COUNTY
AVERAGE MONTHLY RAINFALLS

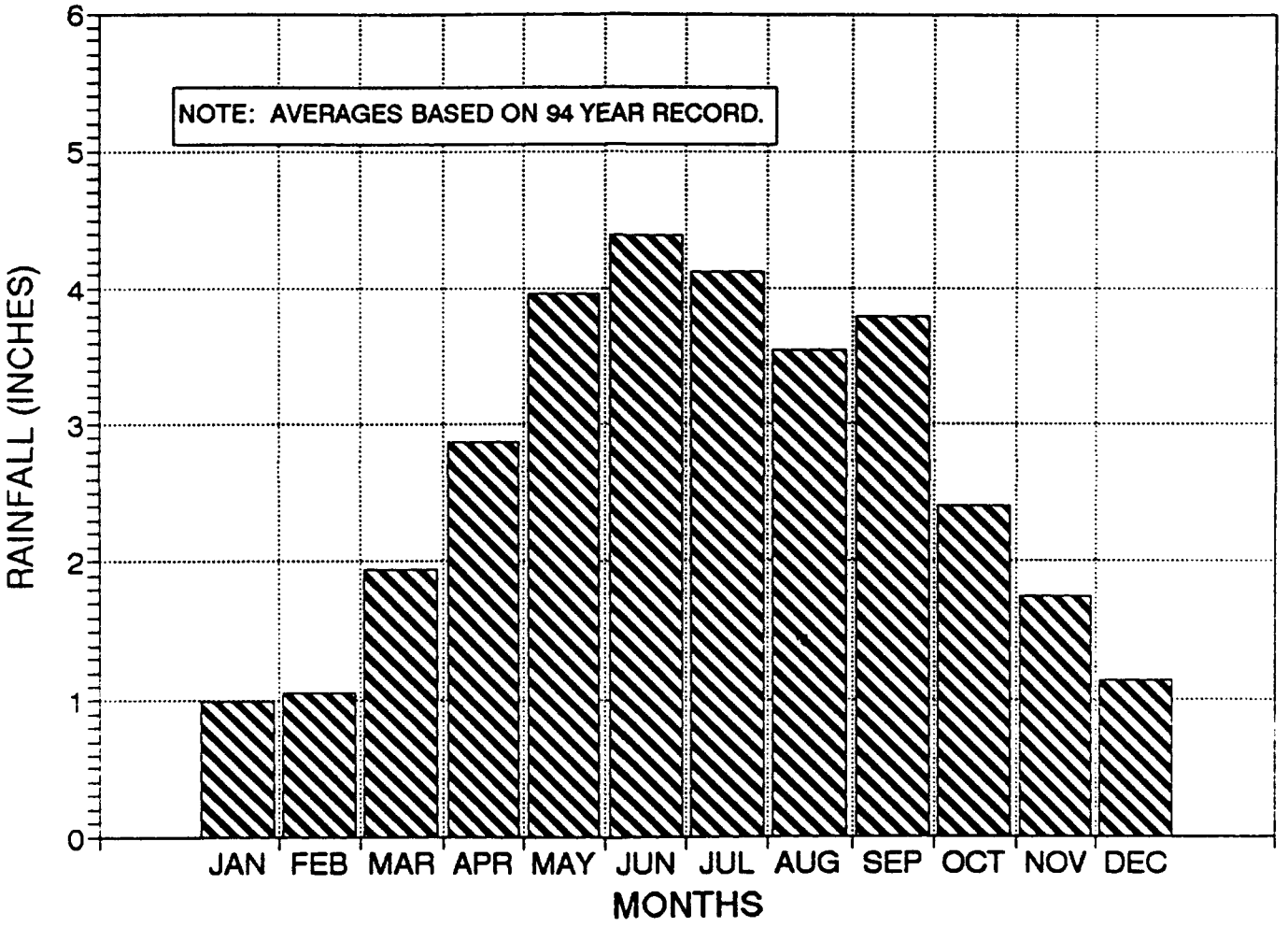
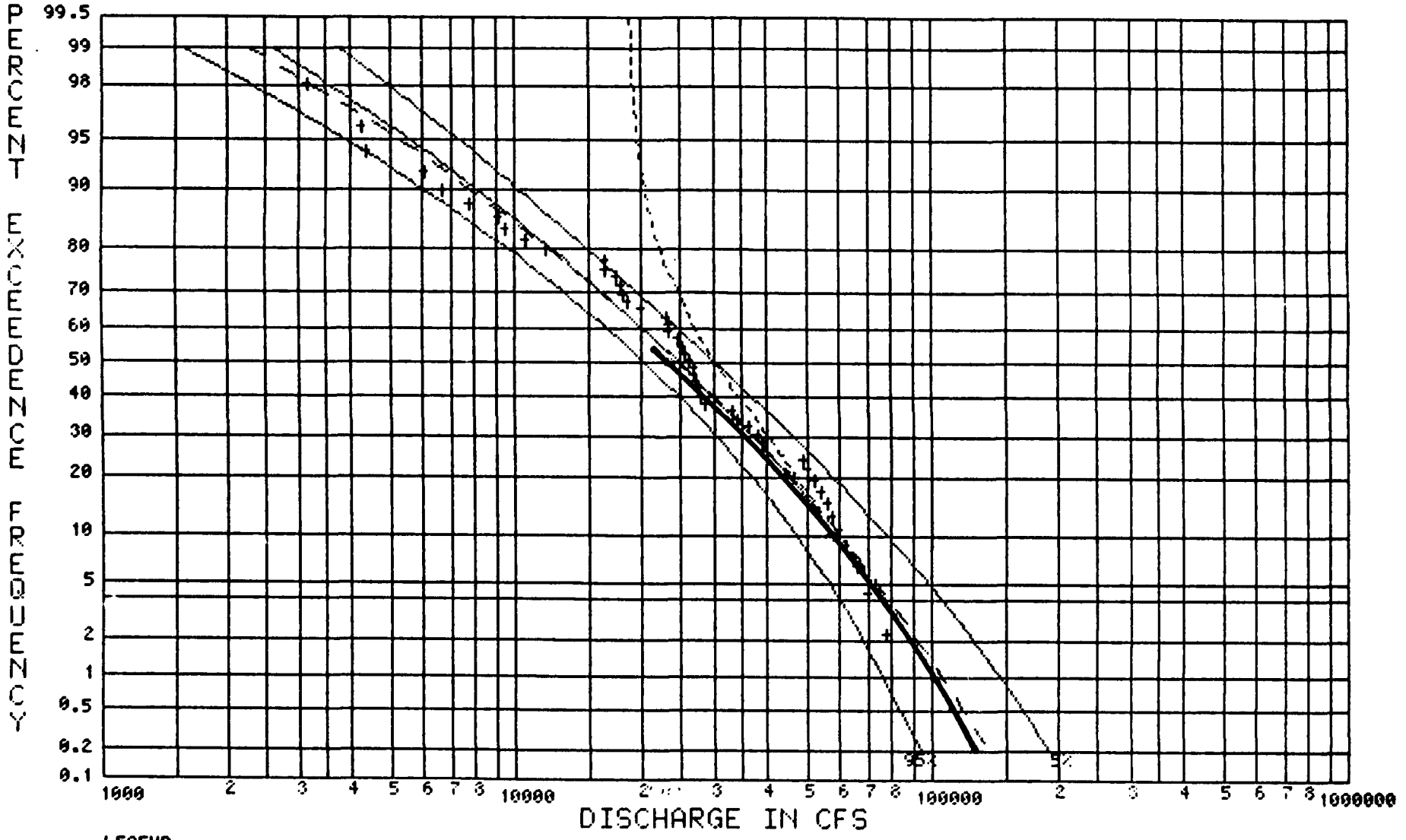


PLATE A-7

FREQUENCY ANALYSIS
05464000 AT WATERLOO GAGE



LEGEND

——— W/O EXP PROB

— — — — WITH EXP PROB

--------- LANGBEIN P.D.

MEAN LOGARITHM	4.3607	*	HISTORIC EVENTS	0
STANDARD DEVIATION	0.3425	*	HIGH OUTLIERS	0
COMPUTED SKEW	-0.7272	*	LOW OUTLIERS	0
GENERALIZED SKEW	-0.4000	*	ZERO OR MISSING	0
ADOPTED SKEW	-0.6000	*	SYSTEMATIC EVENTS	47

——— AT CEDAR FALLS

PLATE A-8

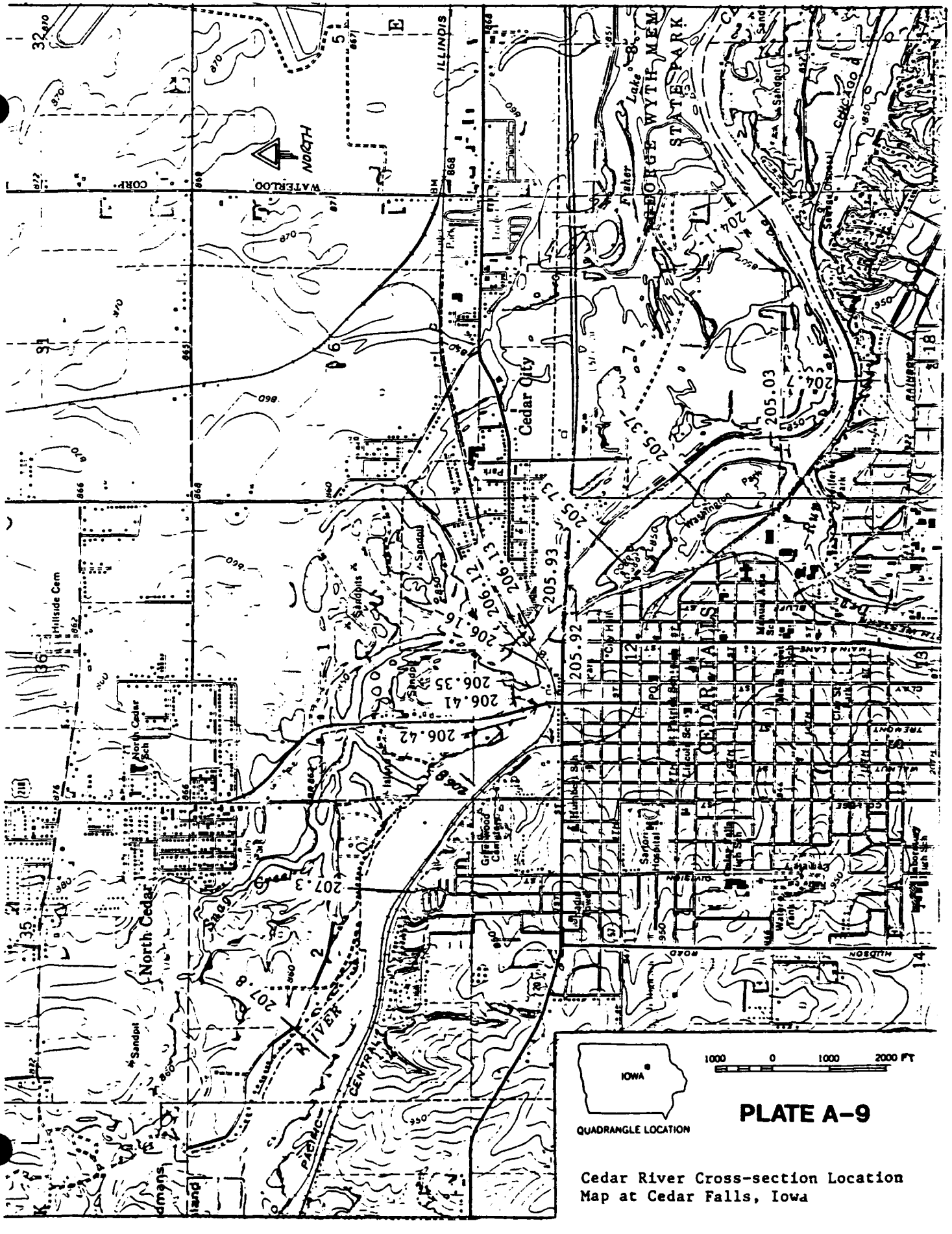


PLATE A-9

Cedar River Cross-section Location Map at Cedar Falls, Iowa

Cedar River Water Surface Profiles at Cedar Falls, IA.

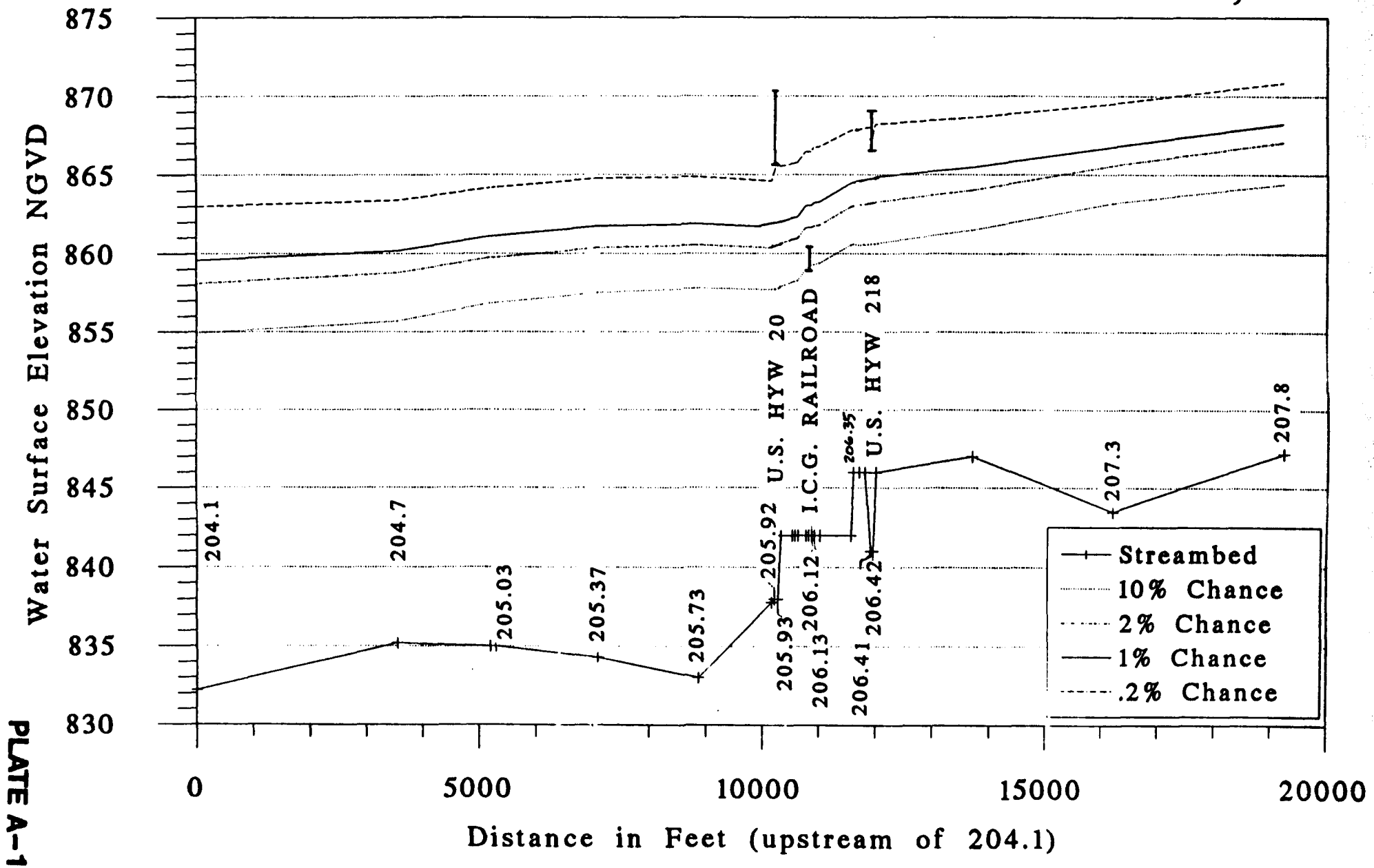


PLATE A-10

E

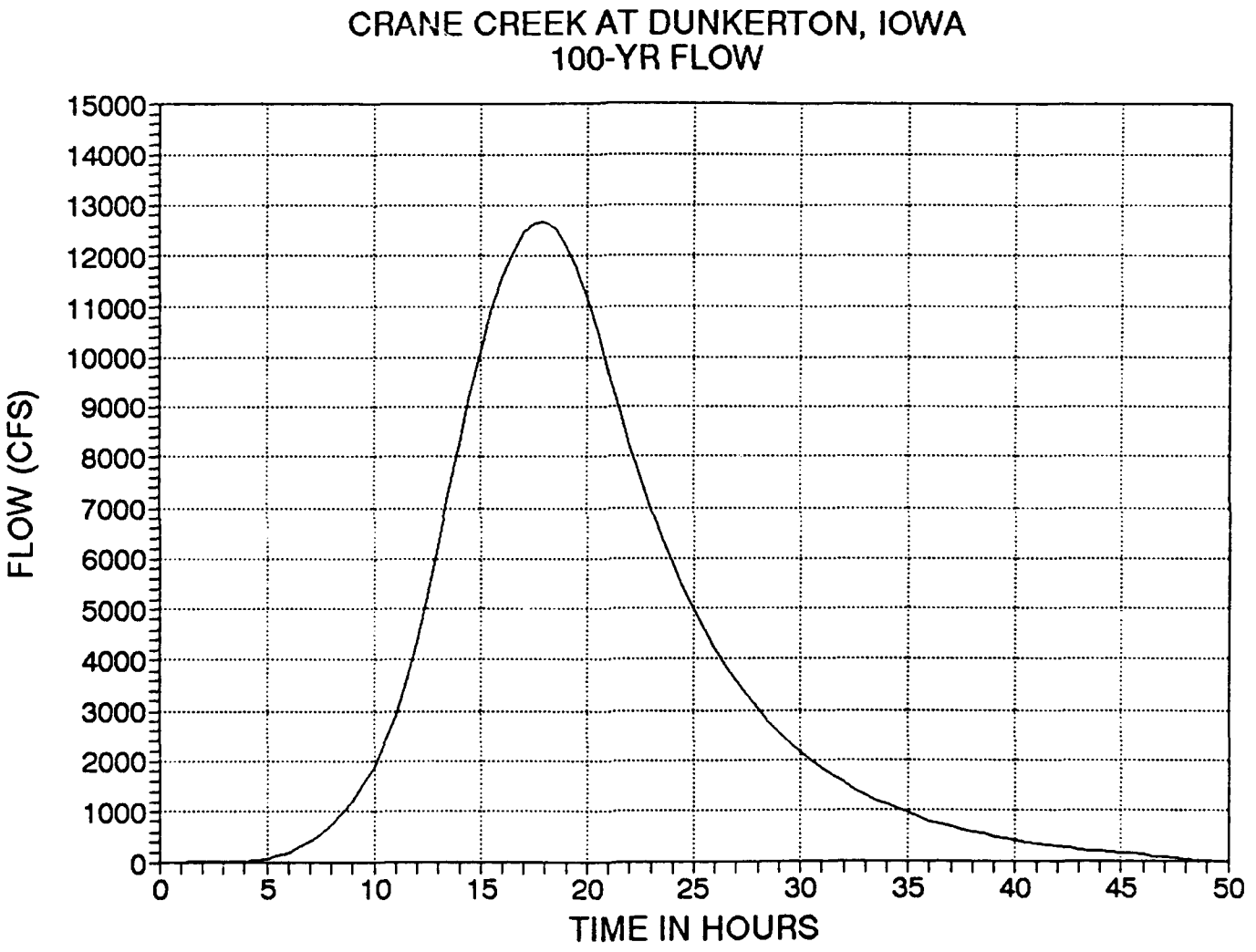

CRANE CREEK AT DUNKERTON, IOWA
100-YR FLOW
FLOW (CFS)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20
25
30
35
40
45
50
TIME IN HOURS

PLATE A-11

CRANE CREEK AT DUNKERTON, IA
FLOOD PROFILES 50 YR

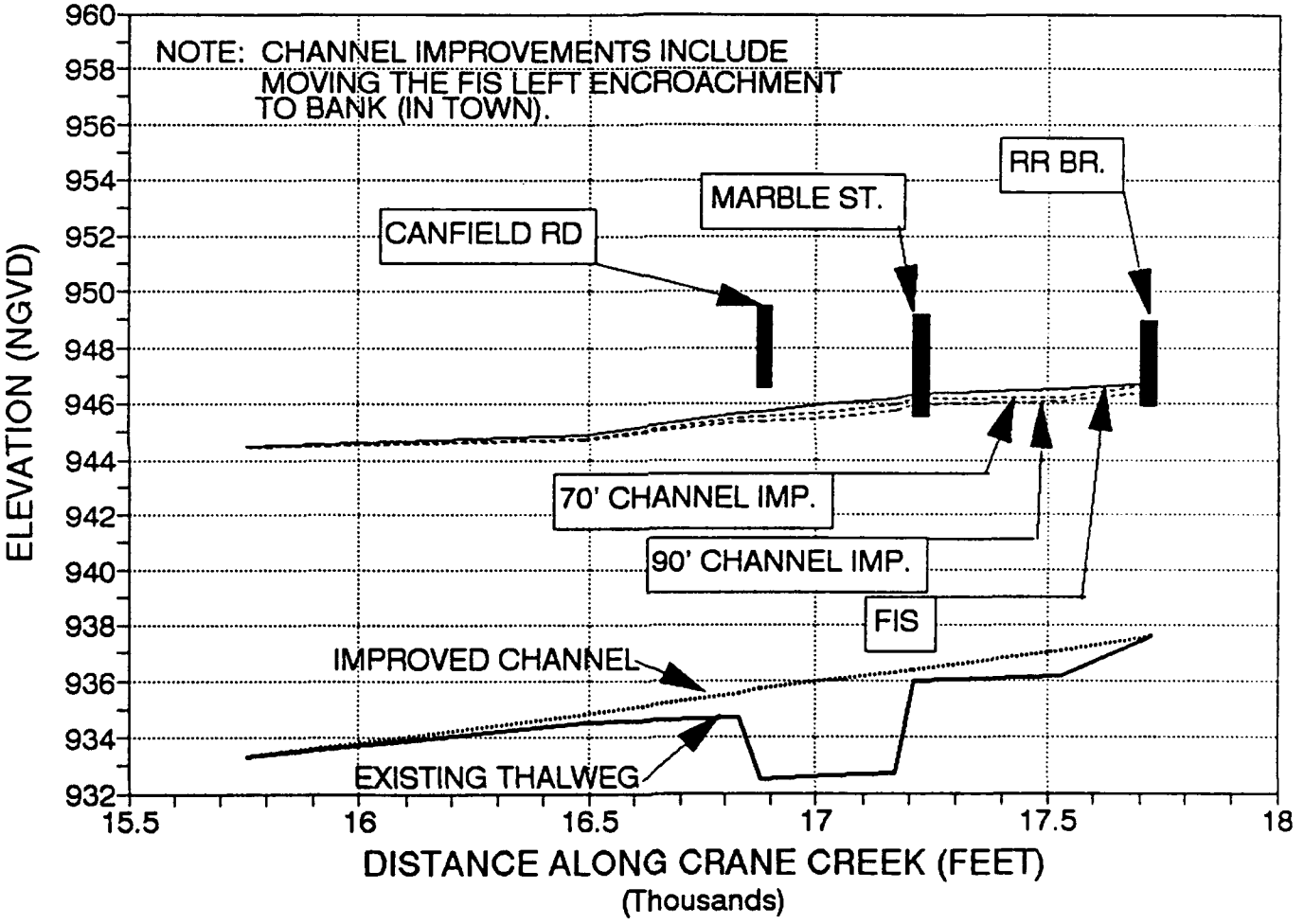


PLATE A–12

CRANE CREEK AT DUNKERTON, IA
FLOOD PROFILES 100 YR

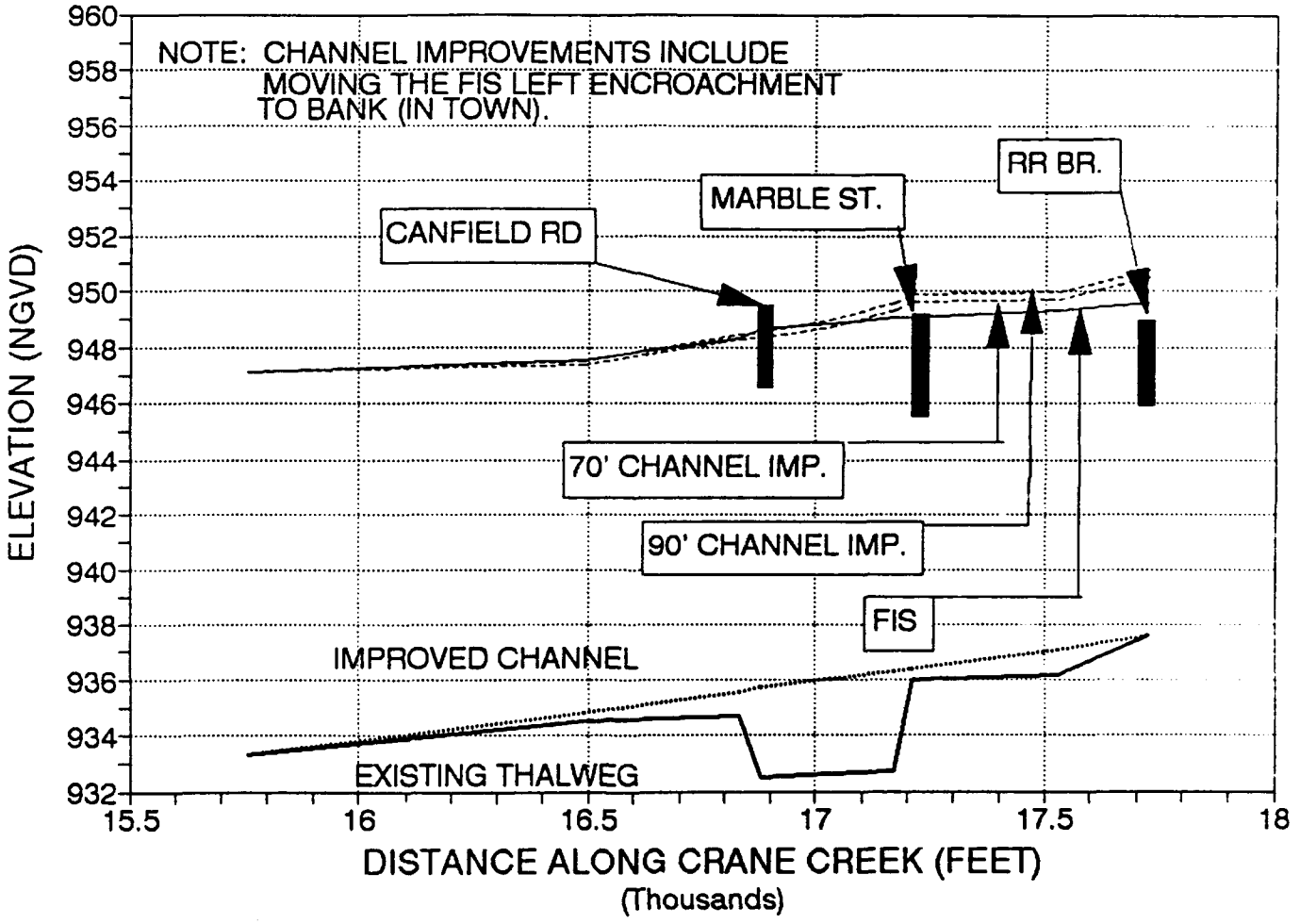
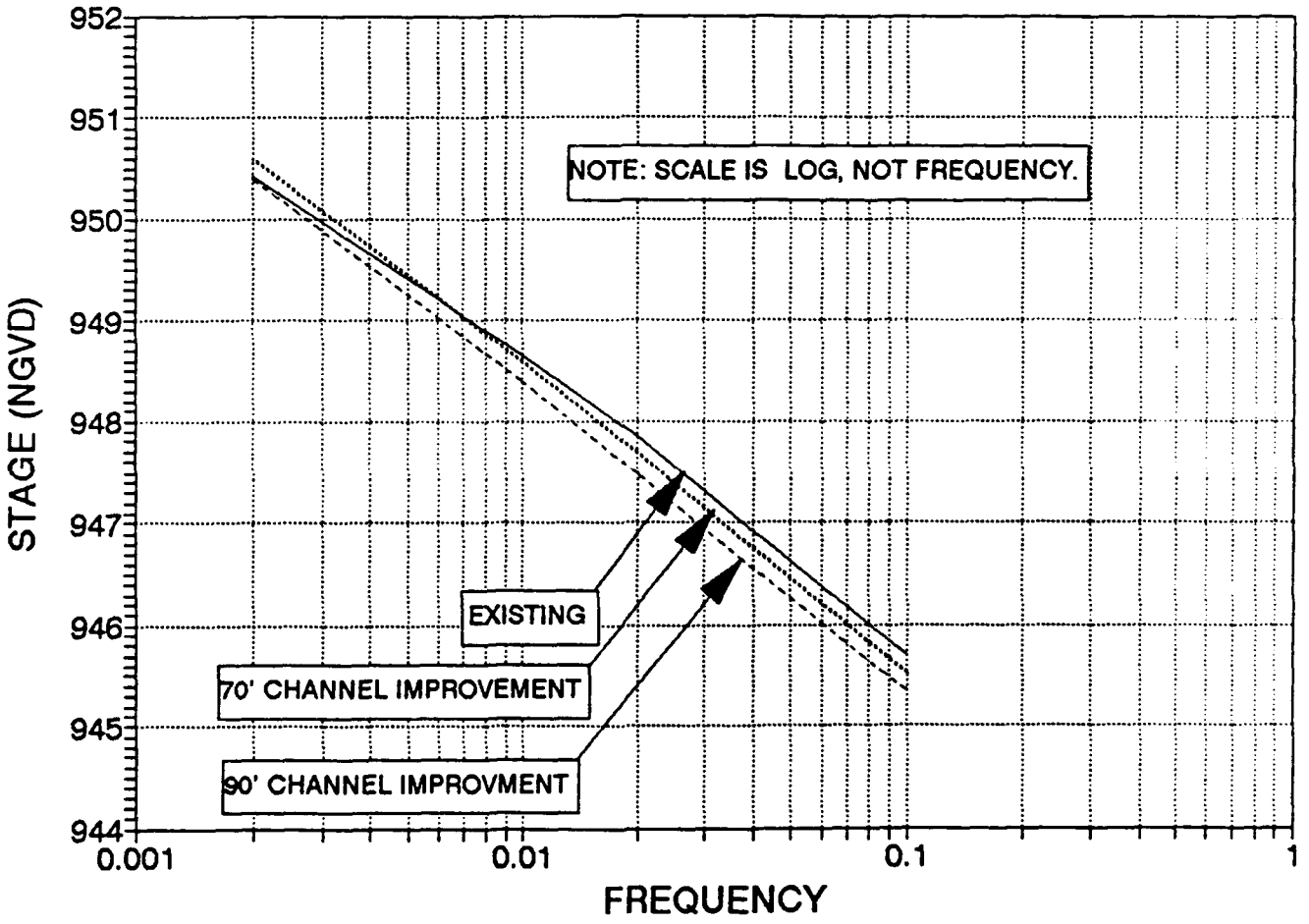


PLATE A-13

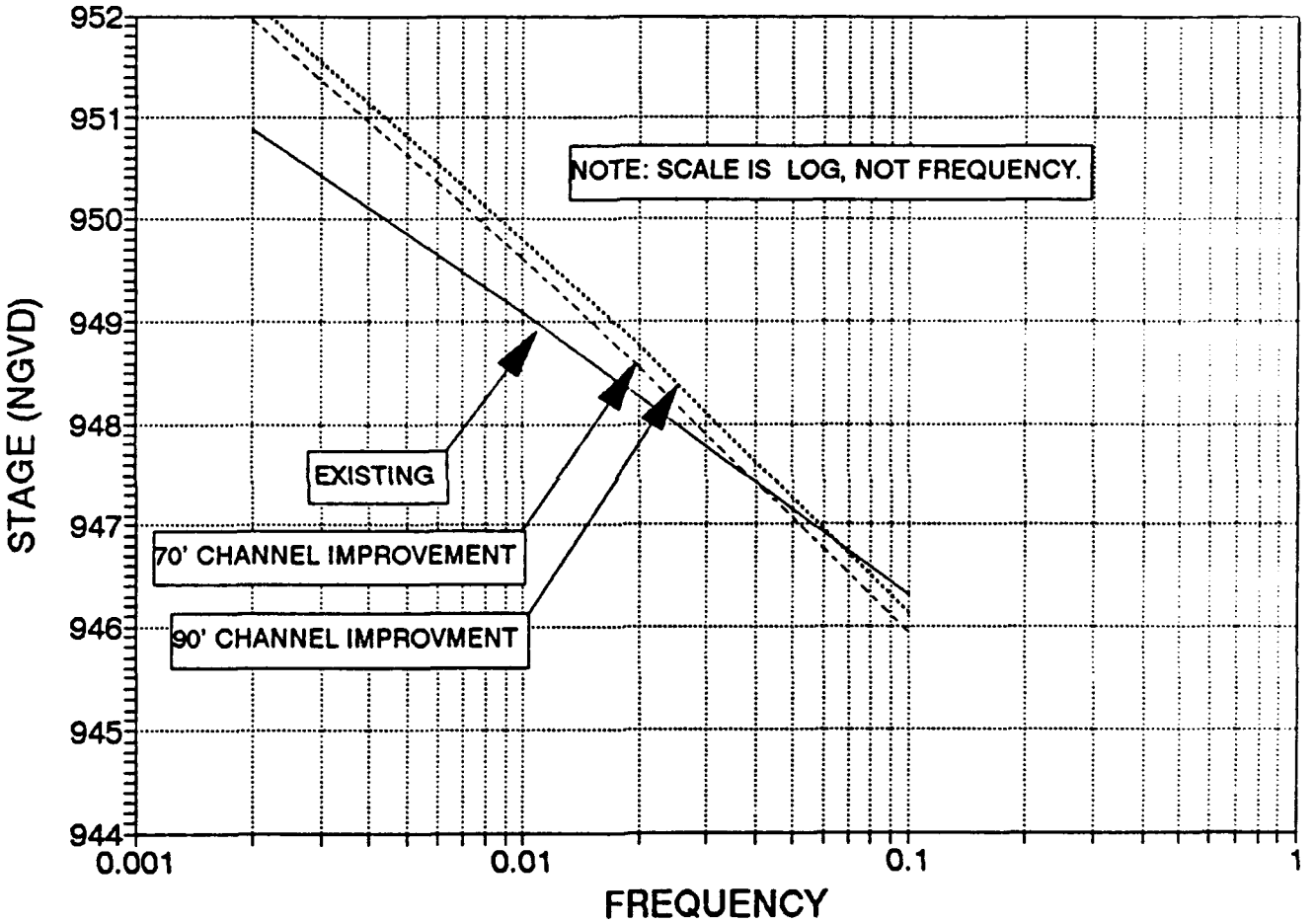
CRANE CREEK AT DUNKERTON
STAGE FREQENCY CURVE, NEAR CANFIELD RD



3-3-91

PLATE A-14

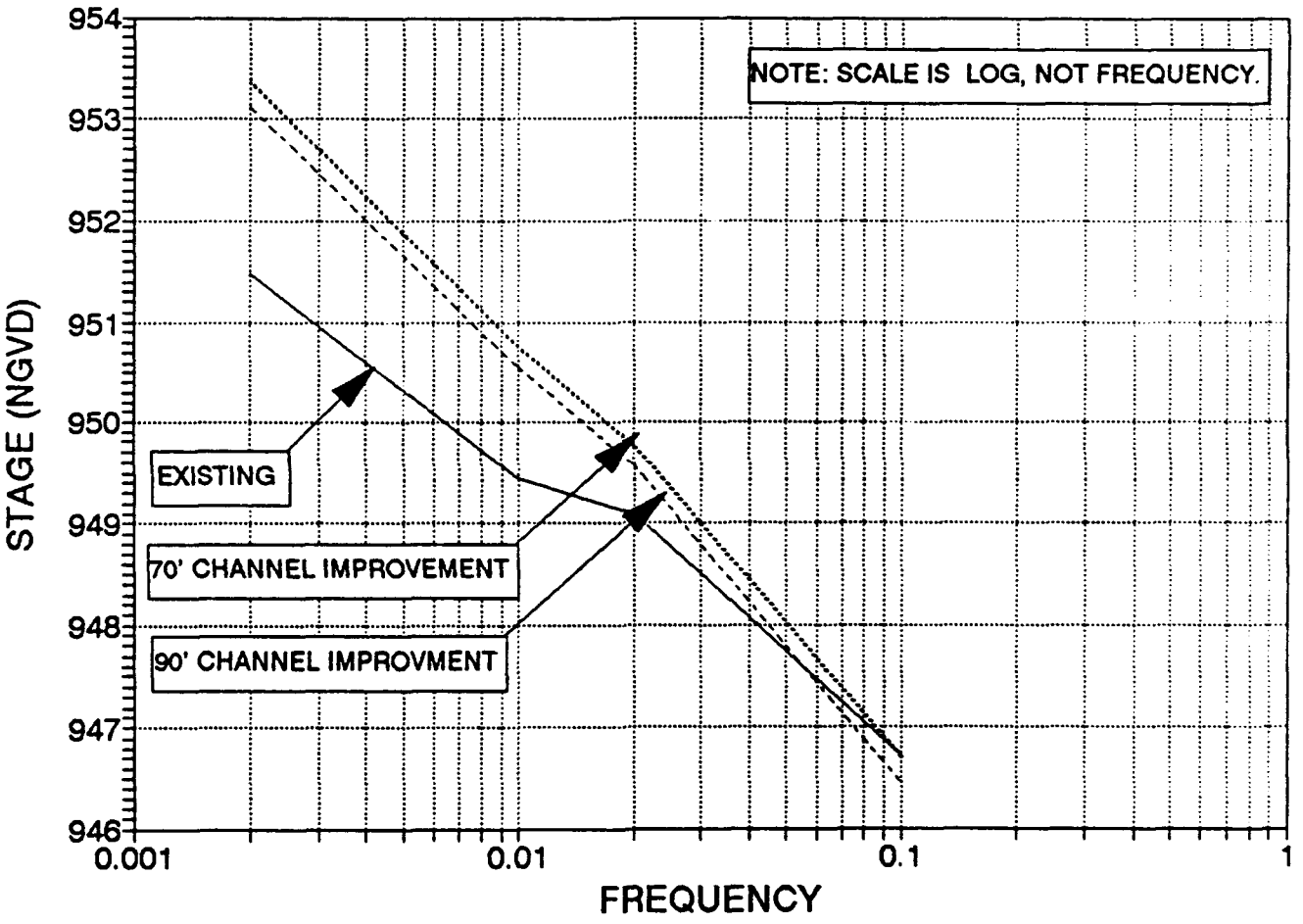
CRANE CREEK AT DUNKERTON
STAGE FREQENCY CURVE, ABOVE MARBLE STR.



3-3-91

PLATE A-15

CRANE CREEK AT DUNKERTON
STAGE FREQENCY CURVE, AT RR BRIDGE



3-3-91

PLATE A-16

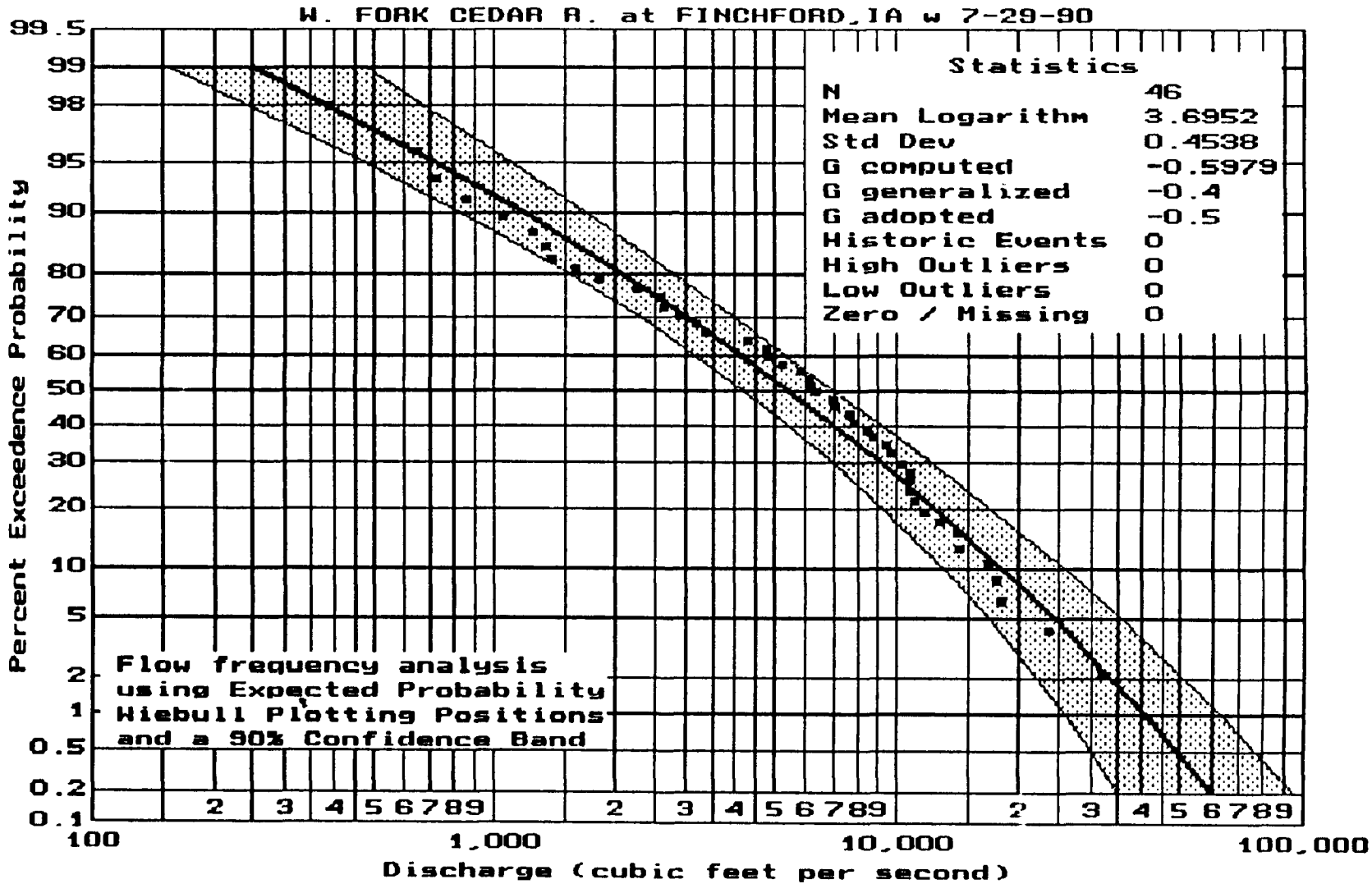

W. FORK CEDAR R. at FINCHFORD,IA w 7-29-90
Statistics
N 46
Mean Logarithm 3.6952
Std Dev 0.4538
G computed -0.5979
G generalized -0.4
G adopted -0.5
Historic Events 0
High Outliers 0
Low Outliers 0
Zero / Missing 0
Flow frequency analysis
using Expected Probability
Weibull Plotting Positions
and a 90% Confidence Band
Percent Exceedence Probability
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
100
1,000
10,000
100,000
Discharge (cubic feet per second)

PLATE A-17

APPENDIX B

ECONOMIC AND SOCIAL ANALYSIS

RECONNAISSANCE STUDY

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

APPENDIX B
ECONOMIC AND SOCIAL ANALYSIS

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List of Tables (Cont'd)

RECONNAISSANCE STUDY

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

APPENDIX B
ECONOMIC AND SOCIAL ANALYSIS

SECTION 1 - INTRODUCTION

This appendix documents the economic and social analysis undertaken to determine the Federal interest in providing flood damage reduction measures and recreational enhancement in selected areas of Black Hawk County, in north-central Iowa. Flood damages are caused primarily by high flows on the Cedar River and its tributaries. Recreational opportunities within the county are insufficient to meet current and future demand, particularly for water-related activities.

The eight parts of this assessment summarize the Reconnaissance Study investigations undertaken by the U.S. Army Corps of Engineers, Rock Island District. Throughout the analysis, price levels are stated as of May 1991, with the Federal discount rate of 8-3/4 percent for water resources projects being used to amortize costs and to discount benefits to a common period of time.

SECTION 2 - CHARACTERISTICS OF THE STUDY AREA

This section of the Economic and Social Analysis Appendix describes the study area and its existing conditions in terms or physical characteristics, demographics and flood problems, with a brief discussion of likely future conditions.

DESCRIPTION

The selected study sites are located along the Cedar River or its tributaries in Black Hawk County, Iowa. Black Hawk County is 573 acres in size, and is primarily developed for agricultural use. The county features the Waterloo-Cedar Falls, Iowa, Metropolitan Statistical Area (MSA) and a number of smaller communities, as depicted on plate 1 of the main report.

The Waterloo-Cedar Falls MSA is home to the University of Northern Iowa (UNI) and its nearly 12,000 students. In addition to the university, the

area's economy is largely supported by agricultural-related industries. For example, John Deere, the area's largest employer, produces agricultural machinery and components. Approximately 200 manufacturers are located within the metro area.

Table B-1 details the types of structures in the five study locations within Black Hawk County. All areas studied in this report are predominantly residential, with most residences being permanent, year-round dwellings.

TABLE B-1

Study Area Floodplain Structure Characteristics

Study Area	Residential Structures	Commercial/Industrial Structures	Public Structures
Dunkerton	98	11	7
Cedar City	180	18	1
East Cedar City	328	12	0
West Cedar City	2	4	0
North Cedar	286	18	1

SOCIOECONOMIC CONDITIONS

The 1990 population data for the study area is shown in table B-2. The 1985 estimated per capita income in Black Hawk County was $10,200, with the median home value of owner-occupied dwellings estimated at $50,000. The unemployment rate in the county was 6.4 percent in February 1991.

TABLE B-2

Population Summary for Black Hawk County, Iowa*

Study Area	1980 Population	1990 Population	Population Change 1980-1990 (%)
Black Hawk County	138,000	123,800	-10.3
Communities:			
Cedar Falls	36,320	34,300	-5.6
Dewar	unavailable	unavailable	
Dunkerton	720	750	3.9
Elk Run Heights	1,190	1,090	-8.1
Evansdale	4,800	4,640	-3.3
Finchford	unavailable	unavailable	
Gilbertville	740	750	1.1
Hudson	2,270	2,040	-10.2
Janesville	840	820	-2.1
La Porte City	2,320	2,130	-8.4
Raymond	660	620	-5.5
Waterloo	75,990	66,470	-12.5
Waterloo-Cedar Falls MSA	162,800	unavailable	

*Source: 1990 U.S. Census of Population, Department of Commerce, Census Bureau.

FLOOD HISTORY

Black Hawk County experienced significant flooding of the Cedar River in past years, with the Cedar River flood of record occurring in March 1961 which was an approximate 25-year event. This flood resulted in areas of residential and commercial property flooding in the metropolitan and outlying areas. More than 600 residents of Cedar Falls were forced to evacuate (evacuation statistics for the remainder of the study area are unavailable). Emergency protection was required at numerous public utilities, and industrial and commercial areas suffered business interruptions in addition to physical damages. Historic data for the Cedar River is shown in the main report.

MOST PROBABLE FUTURE CONDITION

The most probable future condition for the study area (without additional flood protection) will be continued susceptibility to residential, commercial, and industrial flooding, and continued latent demand for recreational activities, including trail use, water sports, and camping.

SECTION 3 - METHODS TO DETERMINE POTENTIAL FLOOD DAMAGE REDUCTION BENEFITS

This section of the Economic and Social Analysis Appendix details the methodology used to measure potential flood damage reduction benefits.

ANALYSIS OF POTENTIAL FLOOD DAMAGE

Rock Island District personnel visited the Black Hawk County study area during the fall of 1990 to assess current conditions and industrial and residential development. Field inventories determined land use and the ground and first floor elevation, structure type, and fair market value for each structure in the study area, for those communities not previously studied. If previous field inventories had been performed for a community, the examination of the study area was used to confirm projections made, update structure values, and update the number and type of structures in the floodplain. Business owners, managers, realtors, and residents were interviewed to obtain data for flood damage estimates. These interviews provided estimates of structure content values, and provided information regarding the level of damage which would occur at differing flood elevations.

Data gathered during field inventories were analyzed using the standard residential damage computer program developed by the Rock Island District from post-flood surveys and flood insurance data. Field inventory data also were utilized to construct damage curves for all commercial, industrial, and public properties. These curves included structure, content, and cleanup costs which would be incurred over a range of possible flood events.

Table B-3 illustrates frequency-damage information by study area.

TABLE B-3

Black Hawk County, Iowa, Study Area
Existing Condition Damages ($1000s)

Flood Frequency	Dunkerton	Cedar City	East Cedar City	West Cedar City	North Cedar
.8	0	0	0	0	0
.1	242.0	146.3	5.7	2.6	250.0
.02	418.0	491.7	322.5	179.5	495.7
.01	1,575.0	773.7	944.3	301.5	635.7
.005	1,846.0	801.6	1,141.7	418.5	651.7
.002	2,419.0	1,333.7	1,790.0	620.3	1,213.6
SPF	3,172.0	2,220.2	3,872.4	643.8	1,719.3

AVERAGE ANNUAL DAMAGES

Average annual damages represent the expected value of flood damages for any given year. Future residential damages are expected to rise as the value of contents in residences increased. Based on current OBERS projections for per capita income growth, residential content value is projected to increase 1.8 percent annually, to 50 percent of structural value. Content value is projected to reach its maximum (50 percent) after 9 years. Future growth scenarios for commercial and industrial properties were not addressed in this report, but will be analyzed in any future feasibility studies. Table B-4 shows average annual damage for the various study areas.

TABLE B-4

Black Hawk County, Iowa
Average Annual Damage by Study Area
(May 91 Prices, $1000s)

Study Area	Residential		Commercial & Industrial	Public	Total
	Existing	Future			
Dunkerton	61.2	2.1	67.2	7.1	137.6
Cedar City	71.5	2.5	20.1	0.7	94.8
East Cedar City	31.3	1.1	3.6	0.1	36.1
West Cedar City	3.5	0.1	10.9	0.0	14.5
North Cedar	113.9	4.0	0.7	1.7	120.3

SECTION 4 - BENEFIT-COST ANALYSIS

This section presents an assessment of benefits which would be associated with the reduction of flood damages in the study area. Throughout this analysis, benefits and costs are stated in May 1991 price levels. A 100-year project life and an 8-3/4 percent discount rate were used to amortize costs and discount benefits to a common time period. Interest during construction was calculated based on a 2-year construction period. Annual operation and maintenance charges and amortized first costs were used to determine total annual charges. Total annual costs were compared with annual benefits to derive net annual benefits and project benefit-to-cost ratios.

BENEFIT ANALYSIS

FLOOD DAMAGE REDUCTION

This study has analyzed the effects of structural (levees) and nonstructural solutions to flooding problems in the study area.

Benefits accruing from the reduction of flood damages are calculated as the difference between "with-project" and "without-project" average annual damages. Table B-5 details existing and future flood damage reduction benefits by category and time period, and summarizes the flood damage reduction benefits and residual damages for the indicated flood damage reduction projects. (Residual damages are flood damages which occur even with a flood damage reduction project.)

The damage-benefit analysis for this study area gives credit for benefits in the freeboard range of protection from any proposed structural alternative. Freeboard benefits are calculated as one-half the area under the damage-frequency curve between the design level of protection and the largest flood which might be carried within the freeboard.

EMERGENCY OPERATION SAVINGS

Provision of flood damage reduction measures would result in reduced emergency operation costs incurred during flooding. These costs include flood fighting, sandbagging, pump costs, and supplies. Emergency cost savings for this analysis were based on records of emergency costs for the 1961 and 1965 floods in Black Hawk County, Iowa. Emergency operations savings for the studied damage reduction projects are summarized in table B-7.

TABLE B-5

Black Hawk County, Iowa
Average Annual Flood Damage
Reduction Benefits by Study Area
(May 91 Prices, 8-3/4 Percent Discount Rate,
100-Year Life, $1000s)

Study Area	Protection Level	Residential		Commercial & Industrial	Public	Total	Residual Damages
		Existing	Future				
Dunkerton	100	56.4	2.0	62.7	6.2	127.3	10.3
Cedar City	100	67.2	2.4	17.4	0.6	87.6	7.2
East Cedar City	100	22.5	0.8	2.0	0.1	25.4	10.7
West Cedar City	100	3.0	0.3	8.5	0	11.8	2.7
North Cedar	100	108.1	3.8	0.2	1.6	113.7	7.2
	50	103.8	3.6	0.1	1.5	109.0	11.3

FLOOD INSURANCE SAVINGS

Administration of the National Flood Insurance Program is a national cost. National economic development benefits resulting from reduced flood insurance costs accrue for properties which would no longer be in the 100-year floodplain following the provision of flood damage reduction measures. For this analysis, it was assumed that all properties in the 100-year floodplain participate in the National Flood Insurance Program, and that coverage would be eliminated if flood protection were provided. For fiscal year 1991, administrative costs of flood insurance are estimated at $79 per policy. These costs are estimated to be the same for residential and business properties. A summary of flood insurance savings associated with each alternative studied is presented in table B-7.

COST ANALYSIS

Table B-6 presents summarized cost data for the selected study areas and alternatives. Estimates shown are for earthen levee plans, unless otherwise indicated.

SUMMARY OF BENEFIT-COST ANALYSIS

Table B-7 presents the benefit-cost analysis for the selected study areas in Black Hawk County, Iowa.

TABLE B-6

Black Hawk County, Iowa
Annual Cost Analysis by Study Area
(May 91 Prices, 8-3/4 Percent Discount Rate,
100-Year Life, $1000s)

Study Area	Protection Level	Cost Estimate	Interest During Construction	Total First Cost	* Annual Cost
Dunkerton	100	1,646.2	98.6	1,744.8	152.7 **
Cedar City	100	3,721.5	280.9	4,002.4	350.3
East Cedar City	100	1,678.1	126.7	1,804.8	158.0
West Cedar City	100	1,145.4	86.5	1,231.9	107.8
North Cedar	100	2,698.3	203.7	2,902.0	254.0
	50	2,105.7	158.9	2,264.6	198.2

* Annual Charges reported in this document exclude the costs of lands, damages, real estate, relocations (LERR), and operation and maintenance (O&M), with the exception of costs reported for the city of Dunkerton, Iowa.

** Annual Charges reported for Dunkerton, Iowa, include $340,000 for LERR and $1,000 for O&M.

TABLE B-7

Black Hawk County, Iowa,
Benefit and Cost Summary
(May 91 Prices, 8-3/4 Percent Discount Rate,
100-Year Life, $1000s)

Study Area	Protection Level	Annual Damage Reduction Benefits	Flood Insurance Savings	Emergency Expense Savings	Total Annual Benefits	Annual Charges*	Net Annual Benefits	Benefit-Cost Ratio
Dunkerton	100	127.3	8.8	21.0	157.1	152.7 **	4.4	1.03
Cedar City	100	87.6	15.5	13.1	116.2	350.3	(234.1)	0.33
East Cedar City	100	25.4	14.9	4.1	44.4	158.0	(113.6)	0.28
West Cedar City	100	11.8	0.5	2.3	14.6	107.8	(93.2)	0.14
North Cedar	100	113.7	21.0	17.8	152.5	254.0	(101.5)	0.60
	50	109.0	0	17.2	126.2	198.2	(72.0)	0.64

* Annual Charges reported in this document exclude the costs of lands, damages, real estate, relocations (LERR), and operation and maintenance (O&M), with the exception of costs reported for the city of Dunkerton, Iowa.

** Annual Charges reported for Dunkerton, Iowa, include $340,000 for LERR and $1,000 for O&M.

SECTION 5 - NONSTRUCTURAL ALTERNATIVES

This section summarizes the analysis of nonstructural alternatives for two study sites: Dunkerton and Cedar City.

METHODOLOGY

Nonstructural solutions considered as part of this analysis include floodproofing, evacuation, and emergency warning systems, as explained in the main report. A detailed examination of floodproofing at Cedar City and a flood-warning system at Dunkerton was undertaken.

FLOOD WARNING SYSTEM

Hydraulic studies indicate that the city of Dunkerton currently has limited response time to floods, due to the flash flood nature of Crane Creek. The proposed flood-warning system would increase the city's warning time to approximately 6 hours. Based on data from a draft report on Flood Warning and Preparedness Systems by Mr. Stewart Davis of the Institute for Water Resources, the proposed flood-warning system would reduce damages at Dunkerton by approximately 3 percent, or $4,100 annually.

FLOODPROOFING OF STRUCTURES

Engineering studies indicate that 45 structures in the northern portion of Cedar City could be floodproofed. Floodproofing measures would involve raising structures an average of 2 feet for the 50-year flood frequency, or an average of 4 feet for the 100-year flood frequency. Flood damage reduction benefits for these measures were calculated in the same manner as described for structural alternatives.

BENEFIT-COST ASSESSMENT

Benefits and costs for nonstructural alternatives are summarized in table B-8.

TABLE B-8

Nonstructural Alternatives, Benefit-Cost Summary
(May 91 Prices, 8-3/4 Percent Discount Rate,
50-Year Life, $1000s)

	Cedar City (Raising Structures)		Dunkerton (Flood Warning System)
Level of Protection for floodproofing	50-Year	100-Year	not applicable
First Cost ($)	787.5	1,264.4	17.3
Floodproofing	(787.5)	(1,264.4)	(0)
Flood Warning System	(0)	(0)	17.3
Annual Charges	70.0	112.3	2.0
Annual First Cost	(70.0)	(112.3)	(1.5)
Annual O & M	(0)	(0)	(0.5)
Annual Benefits	9.7	10.9	4.1
Floodproofing	(9.7)	(10.9)	(0)
Flood Warning System	(0)	(0)	4.1
Benefit-Cost Ratio	0.14	0.10	2.1
Net Benefit	(60.3)	(101.4)	2.1

SECTION 6 - CHANNEL MODIFICATIONS

This section summarizes the benefits associated with removal of sediment from the Cedar River at the Waterloo-Cedar Falls, Iowa Metropolitan Area.

METHODOLOGY

The Rock Island District, Corps of Engineers, has undertaken detailed hydraulic studies to determine the effects of current sedimentation of the Cedar River at Cedar Falls and Waterloo, Iowa. The studies examined two river reaches (see main report plate 15): Reach 1 extends 7.6 miles from the dam in Cedar Falls to the Iowa Power Dam in Waterloo; Reach 2 extends 5.2 miles from George Wyth State Park to the Iowa Power Dam. For each reach, two alternatives were identified: a 2-foot dredge cut and a 3-foot dredge cut.

As explained in the main report, the sedimentation studies examined the impact of flooding of urban areas. The results of these studies indicated that proposed dredging of the Cedar River would result in no significant reduction in the flood profiles for floods greater than 1-year frequency.

FLOOD DAMAGE REDUCTION

The economic assessment of flood damages sustained under existing conditions at Cedar Falls and Waterloo, and the specific study sites of Cedar City, North Cedar, East Cedar City, and West Cedar City indicate that the zero-damage frequency for these areas is greater that the 1-year flood frequency. Therefore, the proposed Cedar River channel modification alternatives would result in no reduction of flood damages.

RECREATIONAL ENHANCEMENT

Examination of typical cross sections of the Cedar River (see main report plates 16, 17, and 18) indicates that the river in Reaches 1 and 2 is of sufficient depth (5 feet) to allow passage by most recreation and fishing boats. While dredging of the river at these reaches would result in a more uniform boating channel, increasing the channel depth by 2 feet or 3 feet would not significantly improve boating access or the boatable water surface area on the river. Corps of Engineers hydraulic studies indicate that the rate of sedimentation in the vicinity of Sans Souci Island is not great enough to threaten recreational access by boaters wanting to fish in this backwater area.

RECREATION BENEFIT COMPUTATION

This study acknowledges that dredging of the Cedar River at either of the study reaches would result in no significant improvement of current recreation opportunities. However, recreationists in the study area perceive that dredging the river would benefit recreational opportunities, by ensuring boat access to backwater fishing areas, for example. Therefore, for the purposes of this study, an assessment of potential recreation benefits resulting from the proposed dredging was performed.

The Unit Day Value Method for general recreation facilities was utilized to evaluate potential recreation benefits associated with the proposed dredging of the Cedar River. A summary of the Unit Day Value Method assessment is provided in table B-9.

Based on ER 1105-2-100, Revised Table 6-28, the Unit Day Value of one recreationist boating or fishing the Cedar River under current conditions is $2.65. Assuming that dredging of the river would greatly benefit recreationists, this Unit Day Value would increase by $0.15 to $0.28 per activity day, depending on the reach and depth of dredge cut (see table B-9).

In 1990, Black Hawk County residents held 14,700 fishing licenses. Assuming that each county resident with a fishing license fished 10 times per year on the reach of the Cedar River under study for dredging, a total of 147,000 activity days would be enhanced by the improvements.

In addition, the county had 9,200 registered boats in 1990. Assuming that each boat was used by 2 recreationists 10 times per year on the subject Cedar River reaches, a total of 184,000 activity days would be enhanced by the improvements.

In total, 331,000 recreation activity days potentially would be enhanced by the proposed dredging alternatives. The resultant potential benefits are summarized in table B-10. Benefits were assumed to remain stable throughout the project life, despite ongoing sedimentation. As indicated, the proposed dredging alternatives lack Federal interest (benefits do not exceed costs), even allowing for perceived recreation benefits.

TABLE B-9

Unit Day Value Assessment for Potential Maximum Recreation Benefits Realized by Dredging the Cedar River at Cedar Falls-Waterloo

Criteria	Judgement Without Project	Judgement With Project: Reach 1 Dredge 2 Ft	Reach 1 Dredge 3 Ft	Reach 2 Dredge 2 Ft	Reach 2 Dredge 3 Ft	Comments
Recreation Experience	3	5	5	4	4	Dredging the river would potentially improve the quality of the fishing/boating experience for recreationists.
Availability of Opportunity	2	3	3	3	3	Dredging the river would potentially provide greater opportunities to access backwater fishing areas.
Carrying Capacity	3	4	4	4	4	Dredging the river would potentially improve the carrying capacity of the river.
Accessibility	4	6	7	5	6	Dredging the river would potentially provide greater access backwater fishing areas.
Environment	5	5	5	5	5	Dredging the river would not impact the aesthetic value of the river corridor.
Total Points	17	23	24	21	22	
Point Value	$2.65	$2.89	$2.93	$2.80	$2.84	
Net increase in value with project		$0.24	$0.28	$0.15	$0.19	
Resultant benefit		$79,400	$92,700	$49,700	$62,900	

TABLE B-10

Potential Benefit-Cost Summary Channel Modification Alternatives
at Waterloo-Cedar Falls, Iowa
(May 91 Prices, 8-3/4 Percent Discount Rate,
10-Year Life, $1000s)

	Reach 1		Reach 2	
	Dredge 2 Ft	Dredge 3 Ft	Dredge 2 Ft	Dredge 3 Ft
First Cost	3,640.0	5,460.0	2,450.0	3,675.0
Annual Charges	561.0	841.4	377.6	566.4
Potential Annual Benefits	79.4	92.7	49.7	62.9
Benefit-Cost Ratio	0.14	0.10	0.13	0.11

SECTION 7 - DEVELOPMENT OF CEDAR VALLEY CONSERVATION/RECREATION MASTER PLAN

This section summarizes the benefits associated with enhancing recreation opportunities within Black Hawk County through completion of the proposed Cedar Valley Lakes Master Plan.

EXISTING RECREATION RESOURCES

The Cedar River Valley provides diverse recreational opportunities for residents of Black Hawk County, as well as visitors from outside the study area. The Cedar River provides opportunities for boating, canoeing, and fishing. While boating on the river is more limited in Waterloo and Cedar Falls due to the existence of several dams, recreationists fish along the river banks and enjoy outings at riverfront parks.

The Cedar Valley Nature Trail follows a route through the Cedar River bottomlands. The 52-mile-long, nationally designated recreation trail links the communities of Waterloo and Cedar Rapids, Iowa. The trail provides opportunities for biking, hiking, running, nature study, and cross country skiing.

In addition to the Nature Trail and municipal parks, the metropolitan area features George Wyth Memorial State Park. George Wyth is one the most popular parks in the State of Iowa. Based on Iowa Department of Natural Resources data, the park has experienced significant annual visitation growth during the past decade, with a 1990 visitation of 519,300. The park's lakes are enthusiastically used by Black Hawk County residents who are isolated from most quality water areas in the state. The park provides opportunities for fishing and sailboating, and offers modern and primitive camping, picnicking, and multi-purpose trails.

Despite the variety of recreational opportunities offered at the state park, George Wyth Park restricts power boating. Therefore, the large demand for water areas within the county suitable for power boating activities remains unfulfilled. In addition, the fishing and sailboating demand within the county are beyond that which can be fulfilled by George Wyth Lake.

In 1990, Black Hawk County had 9,200 registered recreational boats, 7,300 licensed hunters, and 14,700 licensed fishing enthusiasts. The Draft 1990 Iowa State Comprehensive Outdoor Recreation Plan (SCORP) reports that State Recreation Planning Region 3, which includes Black Hawk County, requires an additional 16,723 lake water surface acres and 56 additional boat ramp lanes in order to meet current recreation demand. The 1990 Iowa Outdoor Recreation Supply Survey shows that Black Hawk County needs 5,120

additional acres of lake recreation areas, as well as additional marsh acres and recreation sites.

CEDAR VALLEY LAKES MASTER PLAN

The purpose of the Cedar Valley Conservation/Recreation Master Plan is to coordinate future public open space acquisition, development, and recreational opportunities along a ten mile long corridor encompassing more than 5,000 acres of waterways and riverfront property. The Master Plan goals are to maximize recreation and economic development opportunities, while protecting key natural resources.

The Master Plan builds on an existing 2,000 acres of public lands, and includes: development of recreational lakes and related recreation amenities; connecting existing and planned lakes to provide a canoe and hiking trail system; extending and linking county and metropolitan multi-purpose trail systems; acquiring wetlands and woodlands for wildlife management; and developing a continuing education and retreat complex. The plan primarily focuses on the area of the Cedar Valley extending from Sans Souci Island west and north to the Cedar Wapsi Road in Black Hawk County.

Development of the Cedar Valley Lakes Master Plan would help fulfill the current and projected public demand for recreation trails, boating and fishing opportunities, and other recreation activities within Black Hawk County, Iowa. The need for additional recreation developments in Black Hawk County is supported by the 1990 Outdoor Recreation Supply Inventory and the State's Draft 1990 SCORP. This need also is supported by historic recreation data for the county.

RECREATION BENEFIT COMPUTATION

PRIMARY MARKET ANALYSIS

For the purposes of this analysis, the primary market area was defined as the area which contributes between 80 and 90 percent of the annual visitation to the park. Survey data indicate that generally over 90 percent of the visits to the Rock Island District Mississippi River projects are generated from a location within 40 minutes drive (30 road miles) of the sites.

This criterion was applied to the Cedar Valley Lakes project, based on the amenities offered, its proximity to other larger facilities, and the visitation to George Wyth Memorial State Park. The primary market area for the Cedar Valley Lakes project was assumed to include seven Iowa counties: Benton, Black Hawk, Bremer, Buchanan, Butler, Grundy, and Tama. Residents

of these counties represent the majority of the potential user population of the Cedar Valley Lakes project. The 1990 population figures for the primary market area are summarized in table B-11. In order to assure a conservative estimate, the market area population was assumed to stabilize at the 1990 level, with no growth for the life of the recreation project.

TABLE B-11

Cedar Valley Lakes Project
Primary Market Area - 1990 Population

Iowa County	1990 Population
Benton	22,400
Black Hawk	123,800
Bremer	22,800
Buchanan	20,800
Butler	15,700
Grundy	12,000
Tama	17,400
Total	234,900

Source: 1990 U.S. Census of Population, Department of Commerce, Census Bureau.

The Draft 1990 Iowa State Comprehensive Outdoor Recreation Plan (SCORP) defines latent recreation participation as unfulfilled recreation participation for activities Iowans would like to do more of but cannot, due to limited or unsuitable recreation areas. The SCORP reports that 8 percent of Iowans have latent demand for power boating and water skiing activities; 10 percent for fishing. The SCORP also reports that Iowans who participate in power boating and water skiing do so an average of 11.5 times per year; those who participate in fishing do so an average of 17.9 times per year.

This analysis assumes that the Cedar Valley Lakes project would fulfill 20 percent of the latent demand for power boating and waterskiing and fishing experienced by residents in its 7-county primary market area. In order to assure a conservative estimate, only new recreation generated by the project was included in this analysis; it was assumed that recreationists currently using other facilities in the vicinity would not utilize or benefit from the project.

The calculation of annual activity days of use for fishing and boating activities at the Lakes project was calculated as shown below:

Power Boating and Water Skiing:

234,900 Primary market area population
x 0.08 Percent latent demand

18,792
x 11.5 Activity days per year

216,108
x 0.20 Percent of latent demand fulfilled by project

43,222 Annual power boating and water skiing activity days

Fishing:

234,900 Primary market area population
x 0.10 Percent latent demand

23,490
x 17.9 Activity days per year

420,471
x 0.20 Percent of latent demand fulfilled by project

84,094 Annual fishing activity days

As indicated, approximately 127,300 activity days of recreation would be generated by the Cedar Valley Lakes project. Again, this represents a conservative estimate based only on use by residents in the primary market area with unfulfilled power boating, water skiing, or fishing demands. In addition, activity days were assumed to stabilize at the 1990 level, with no growth for the life of the recreation project.

METHODOLOGY

The Unit Day Value Method for general recreation facilities was used to evaluate the benefits associated with development of additional water and land based recreation facilities in the county, as described in Section 6 of this appendix. Table B-12 summarizes the criteria and rationale for the assignment of points to determine Unit Day Values with the proposed recreation developments. The value of recreation benefits resulting from the proposed development is presented in table B-13.

RECREATION AMENITY COST ASSESSMENT

Recreation developments proposed in the Cedar Valley Lakes Master Plan involve property acquisition and site development. The Iowa Northland Council of Governments provided cost estimates for these recreation enhancements and acquisitions, which are summarized in table B-14.

BENEFIT AND COST SUMMARY FOR RECREATIONAL AMENITIES

Table B-15 summarizes the benefits and costs associated with the proposed recreational enhancements for Black Hawk County. Costs are stated in May 1991 price levels, with amortization at 8-3/4 percent, and a 50-year project life. Operation and maintenance costs were unavailable for this analysis. Interest during construction was not computed due to the short construction period associated with each amenity. As indicated, the proposed Cedar Valley Lakes Development appears to economically justified, based on National Economic Development criteria. Additional benefits, which might be realized by the local economy, would include increased jobs and tax revenues resulting from tourism and related developments.

TABLE B-12

Unit Day Value Assessment for Recreation Developments
Associated with the Cedar Valley Lakes Master Plan

Criteria	Judgement with Project Yrs 0-4	Yrs 5-13	Yrs 14-22	Yrs 23-50	Comments
Recreation Experience	6	7	9	10	Provision of additional recreation facilities would help fulfill a latent demand within the project market area.
Availability of Opportunity	5	7	9	10	Implementation of the Master Plan would greatly increase the water surface area and fishing opportunities available to recreationists, helping to fulfill latent demand in the primary market area.
Carrying Capacity	6	7	9	10	Existing recreation developments would be upgraded and expanded, while new facilities would be developed.
Accessibility	6	8	10	10	Accessibility within and between recreation areas would be improved, with the addition of a comprehensive trail network and waterway connections between facilities.
Environment	5	7	7	9	The Master Plan calls for acquisition and preservation of valuable wildlife habitat, and includes a variety of tree plantings. In addition, the Master Plan includes removal of several structures and cleanup of properties obtained which currently lower area aesthetics.
Total Points	28	36	44	49	
Point Value	$3.11	$3.47	$3.93	$4.28	
Net Increase from $3.11 Base Value		$0.36	$0.82	$1.17	

TABLE B-13

Annualized Recreation Benefits Associated with
Cedar Valley Lakes Master Plan
(May 91 Prices, 8-3/4 Percent Discount Rate,
50-Year Life, $1000s)

Years	Benefit Computation
0-4	127,300 activity days x $3.11 - $395,900 - Base Benefit
5-13	127,300 x $0.36 x PW_{5-13} x CRF_{50} - $ 17,600
14-22	127,300 x $0.82 x PW_{14-22} x CRF_{50} - $ 18,900
23-50	127,300 x $1.17 x PW_{23-50} x CRF_{50} - $ 21,600

Total Annual Benefit - $454,000

Note: PW_{5-13} = 4.330284
PW_{14-22} = 2.035415
PW_{23-50} = 1.632898
CRF_{50} = 0.08884

TABLE B-14

Summary of Recreation Development Costs,*
Cedar Valley Lakes Master Plan
(May 91 Prices, 8-3/4 Percent Discount Rate,
50-Year Life, $1000s)

Year	Acquisition Cost	Development Cost*	Total Cost	Present Worth of Cost
0	750.0	1,217.0	1,967.0	1,967.0
5	1,046.0	1,330.0	2,376.0	1,562.1
14	416.3	940.0	1,356.3	419.1
23	515.0	0	515.0	74.8
Total Cost				4,023.0
Annualized Cost				357.4

*NOTE: Only those developments for which a cost estimate was provided are included in this analysis. As a result, the following recreation developments were excluded from this benefit-cost assessment: wetlands, fishing lake, and trail development at George Wyth West expansion area; and access road and boat access to 40-Acre Lake. In addition, the Lake Shore Housing Site and Office Park developments, and the Black Hawk County Conservation Board Headquarters were also excluded from this assessment, since they do not qualify as recreation enhancement components.

TABLE B-15

Benefit-Cost Summary for Recreation Developments
Associated with the Cedar Valley Lakes Master Plan
(May 91 Prices, 8-3/4 Percent Discount Rate,
50-Year Life, $1000s)

Annual Cost	$357.4
Annual Benefit	$454.0
Benefit-Cost Ratio	1.3
Net Benefits	$ 96.6

SECTION 8 - SOCIOECONOMIC ASSESSMENT

The following socioeconomic assessment examines the impacts of the providing flood damage reduction measures at Dunkerton, Iowa.

SOCIOECONOMIC IMPACTS

The socioeconomic impacts associated with the proposed 100-year flood damage reduction plan at Dunkerton, Iowa would be positive. The project would provide the backbone for revitalization of the community. The reduced threat of flooding would solidify community cohesion and increase community pride, and would improve the community's economic viability for the continued operation of existing businesses. Further, the project would make Dunkerton a more attractive site for the establishment of new commercial businesses, increasing employment opportunities for residents.

The project would enhance affected residential and business areas and could increase property values and related tax revenues. Property owners would likely renovate deteriorated structures and vacant properties would be reoccupied. The community would benefit from reduced damages to public facilities, and from reduced life, health, and safety risks associated with flooding.

The project would necessitate displacement of a small number of residential and commercial structures. The affected structures are located in the floodway and experience extensive flood damages during even small floods; several of these structures have been abandoned or are vacant. While the affected business owners and residents would be adversely impacted by having to move to new locations within the city, this impact would be offset by the positive aspects of the relocations: affected property owners would be relocated to areas outside of the floodplain and no longer would experience flood damages; and removal of the vacant and/or abandoned structures would improve the aesthetics of the town's business district.

A more detailed discussion of socioeconomic impacts will be included in any future feasibility study or environmental assessment for the Black Hawk County study area.

APPENDIX C

ENVIRONMENTAL CONSIDERATIONS

RECONNAISSANCE REPORT

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA

APPENDIX C
ENVIRONMENTAL CONSIDERATIONS

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CEDAR RIVER AND TRIBUTARIES
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APPENDIX C
ENVIRONMENTAL CONSIDERATIONS

EXISTING ENVIRONMENTAL CONDITIONS

GENERAL

The Rock Island District of the U.S. Army Corps of Engineers was authorized to undertake a reconnaissance study to review previous reports in the interests of flood control, water and recreation development, and allied purposes in Black Hawk County, Iowa.

Several sites in the county were investigated to determine if there are economically, environmentally, socially, and technically acceptable flood damage reduction solutions that warrant further Federal consideration. Sites identified for more detailed consideration are Hudson, Dunkerton, Cedar City, North Cedar, and the Cedar River near Sans Souci Island in Waterloo.

CLIMATE

The climate of Black Hawk County is temperate continental characterized by warm, humid summers and cold winters. Mean annual precipitation is approximately 33 inches. The annual temperature ranges from an average of 17 degrees Fahrenheit (F.) in January to a July average of 74 degrees F. Mean annual temperature is 47 degrees F.

GEOLOGY, SOILS, AND GENERAL WATER QUALITY

Black Hawk County lies on part of the Paleozoic Plateau known as the Iowan Surface, formed during Wisconsinan glacial time through erosional processes. Here, the land surface is generally of low relief except for prominences called pahas, which represent portions of the ancient land surface that escaped erosion. Soils are built upon drift or thin layers of loess. Among the various Iowa landforms, only the Des Moines Lobe has less loess cover.

Drainage of the Iowan Surface is primarily by the upper and middle Maquoketa, Wapsipinicon, and Cedar Rivers. Drainage networks are well established, and the river basins are roughly parallel, running approximately northwest to southeast. The Cedar River is the largest drainage within the Iowan Surface. The Wapsipinicon River lies to the east of the Cedar. The Maquoketa is the smallest and easternmost stream, notable for its high gradient. All these rivers have good water quality, the Maquoketa being exceptionally clear. Because of urban and agricultural development within its basin, the Cedar river has become considerably more turbid, but many of its tributary streams are little changed in this respect. There are no natural lakes on the Iowan Surface, but there are many overflow areas and backwater ponds along the stream channels.

Land use on the Iowan Surface is primarily agricultural. Within the upper Cedar basin, for example, about 78 percent of the area is cropland and about 13 percent is pasture and forest.

Each study site is dominated by loamy alluvial land which is characterized by being nearly level, poorly drained silty and loamy soils. This soil type is alluvial materials such as sand and newly deposited soils.

FLORA

Tree species noted at each site are dominated by bottomland species such as cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), willow (*Salix* sp.), mulberry (*Morus rubra*), ash (*Fraxinus* sp.), hackberry (*Celtis occidentalis*), and American elm (*Ulmus americana*). These species are commonly found in palustrine forested wetlands, disturbed, or low areas.

No unusual or critical terrestrial habitats are known to exist within any of the study ares.

FAUNA

The Cedar River supports a sport fishery of bass, catfish, northern pike, and carp. The smaller streams, Crane Creek, Elk Run Creek, and Black Hawk Creek, support more nongame species such as minnows, chubs, and suckers.

Brook trout and sculpins formerly occurred in Cedar and Maquoketa creeks, but today warmwater and coolwater species dominate. At least 29 species of minnows have been recorded from Iowan Surface waters. Several have their Iowa distributional centers in the area: gravel chub, largescale stoneroller, and redfin shiner. More types of perches occur in Iowan Surface waters the anywhere else in the state. These include yellow perch, walleye, sauger, and 13 of the 16 darters. The gilt darter, now probably extinct in Iowa, is known only from specimens taken by Meek in the middle Cedar River. Thirteen of the 16 suckers in Iowa have been found in the

area. Recent collecting has demonstrated the presence of the rare black redhorse in some creeks and rivers. All 11 native Iowa sunfishes are known from these waters. The state-extirpated long ear sunfish may have occurred in the upper Cedar River as late as the 1960's.

Mammals occurring in Black Hawk County are contained in table C-1. Birds observed in the county are listed in table C-2; amphibians and reptiles in table C-3.

ENDANGERED SPECIES

In accordance with the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service (USFWS) has furnished a list of endangered species which may be present at the study areas.

The only species federally listed for Black Hawk County is the peregrine falcon (*Falco peregrinus*). Records show this species as nesting in the county within historic times. No suitable habitat for the peregrine falcon was found in the study areas, and the USFWS has indicated that the proposed work should have no adverse impacts on the species.

Migratory bald eagles (*Haliaeetus leucocephalus*) also are found along the Cedar River on occasion. They use the study area on an intermittent basis and are dependent on the presence of perching trees along the river. The USFWS has indicated there should be no impact to bald eagles if large trees along the river are not disturbed.

The Planning Aid Letter included in the correspondence appendix contains USFWS comments required under Section 7 of the Endangered Species Act of 1973.

Records of the Natural Areas Inventory of the Iowa Department of Natural Resources (IDNR) show that George Wyth State Park, on the eastern edge of the North Cedar/Cedar City study area, is one of only two locations in the state supporting populations of the blue-spotted salamander (*Ambystoma laterale*). This species may be Iowa's rarest extant amphibian. The blue-spotted salamander requires shallow woodland ponds for breeding and hibernates in relatively undisturbed woodlands. This habitat is present along the Cedar River throughout its course. It is not known at this time how much, if any, suitable habitat is located within the study area.

TABLE C-1

Mammals Found in Black Hawk County

Didelphidae	
Didelphis virginiana virginiana	Virginia Opossum
Soricidae	
Sorex cinereus haydeni	Masked Shrew
Blarina brevicauda brevicauda	Short-Tailed Shrew
Talpidae	
Scalopus aquaticus machrinus	Eastern Mole
Vespertilionidae	
Lasiurus borealis borealis	Red Bat
Myotis lucifugus lucifugus	Little Brown Bat
Pipistrellus subflavus subflavus	Eastern Pipistrelle Bat
Nycticeius humeralis humeralis	Evening Bat
Leporidae	
Sylvilagus floridanus mearnsi	Eastern Cottontail
Lepus townsendii campanius	White-Tailed Jackrabbit
Sciuridae	
Spermophilus tridecemlineatus	Thirteen-Lined Ground Squirrel
Spermophilus franklinii	Franklin's Ground Squirrel
Glaucomys volans volans	Southern Flying Squirrel
Marmota monax monax	Woodchuck
Sciurus carolinensis pennsylvanicus	Gray Squirrel
Sciurus niger fufiventer	Fox Squirrel
Tamias striatus griseus	Eastern Chipmunk
Tamiasciurus hudsonicus minnesota	Red Squirrel
Geomyidae	
Geomys bursarius majusculus	Plains Pocket Gopher
Heteromyidae	
Perognathus flavescens perniger	Plains Pocket Mouse

TABLE C-1 (Cont'd)

Castoridae	
Castor canadensis	Beaver
Cricetidae	
Microtus ochrogaster ochrogaster	Prairie Vole
Microtus pennsylvanicus pennsylvanicus	Meadow Vole
Ondatra zibethicus zibethicus	Muskrat
Peromyscus leucopus noveboracensis	White-Footed Mouse
Peromyscus maniculatus bairdi	Deer Mouse
Reithrodontomys megalotis dychei	Western Harvest Mouse
Muridae	
Mus musculus	House Mouse
Rattus norvegisuc	Norway Rat
Canidae	
Canis latrans thamnos	Coyote
Urocyon cinereoargenteus ocythous	Grey Fox
Vulpes vulpes	Red Fox
Procyonidae	
Procyon lotor hirtus	Raccoon
Mustelidae	
Taxidea taxus taxus	Badger
Mephitis mephitis hudsonica	Striped Skunk
Mustela frenata primulina	Long-Tailed Weasel
Mustela nivalis campestris	Least Weasel
Mustela vision letifera	Mink
Spilogale putorius	Spotted Skunk
Felidae	
Lynx rufus rufus	Bobcat
Cervidae	
Odocoilus virginianus macrourus	White-Tailed Deer

TABLE C-2

A List of Birds Occurring in
Robertson's Sanctuary-Leonard Katoski Greenbelt*

Accipitridae	
Accipiter cooperii	Cooper's Hawk
Accipiter striatus	Sharp-Shinned Hawk
Buteo jamaicensis	Red-Tailed Hawk
Buteo lagopus	Rough-Legged Hawk
Buteo lineatus	Red-Shouldered Hawk
Circus cyaneus	Northern Harrier
Alcedinidae	
Megaceryle alycon	Belted Kingfisher
Anatidae	
Aix sponsa	Wood Duck
Anas Discors	Blue-Winged Teal
Anas platyrhynchos	Mallard
Apodidae	
Chaetura pelagica	Chimney Swift
Ardeidae	
Ardea herodias	Great Blue Heron
Botaurus lentiginosus	American Bittern
Butorides virescens	Green Heron
Bombycillidae	
Bombycillidae cedrorum	Cedar Waxwing
Caprimulgidae	
Chordeiles minor	Common Nighthawk
Passerina cyanea	Indigo Bunting
Pheucticus ludovicianus	Rose-Breasted Grosbeak
Pipilo erythrophthalmus	Rufus-Sided Towhee
Richmondena cardinalis	Cardinal
Spinus pinus	Pine Siskin
Spinus tristis	American Goldfinch
Spizella arborea	Tree Sparrow
Spizella pallida	Clay-Colored Sparrow
Spizella pusilla	Field Sparrow

TABLE C-2 (Cont'd)

Spiza americana	Dickcissel
Zonatrichia albicollis	White-Throated Sparrow
Zonatrichia leucophrys	White-Crowned Sparrow
Certhiidae	
Certhia familiaris	Brown Creeper
Charadriidae	
Charadrius vociferous	Killdeer
Columbidae	
Columba livia	Rock Dove
Zenaidura macroura	Mourning Dove
Corvidae	
Corvus brachyrhynchos	Common Crow
Cyanocitta cristata	Blue Jay
Cuculidae	
Coccyzus americanus	Yellow-Billed
Coccyzus erythropthalmus	Black-Billed Cuckoo
Falconidae	
Falco sparverius	Sparrow Hawk
Fringillidae	
Acanthis flammea	Common Redpoll
Carpodacus purpureus	Purple Finch
Junco hyemalis	Slate-Colored Junco
Melospiza melodia	Song Sparrow
Melospiza georgiana	Swamp Sparrow
Melospiza lincolnii	Lincolns Sp
Passerella iliaca	Fox Sparrow
Sturnella neglecta	Western Meadowlark
Quiscalus quiscula	Common Grackle
Hirundinidae	
Hirundo rustica	Barn Swallow
Iridoprocne bicolor	Tree Swallow

TABLE C-2 (Cont'd)

Petrocheloidon pyrrhonota	Cliff Swallow
Progne subis	Purple Martin
Riparia riparia	Bank Swallow
Stelgidopteryx ruficollis	Rough-Winged Swallow
Icteridae	
Agelaius phoeniceus	Red-Winged Blackbird
Dolichonyx oryzivorus	Bobolink
Euphagus carolinus	Rusty Blackbird
Icterus galbula	Northern Oriole
Molothrus ater	Brown-Headed Cowbird
Sturnella magna	Eastern Meadowlark
Laridae	
Larus argentatus	Herring Gull
Mimidae	
Dumetella carolinensis	Catbird
Mimus polyglotto	Mockingbird
Toxostroma rufum	Brown Thrasher
Pandionidae	
Pandion haleaetus	Osprey
Paridae	
Parus atricapillus	Black-Capped Chickadee
Parus bicolor	Tufted Titmouse
Parulidae	
Dendroica castabea	Bay-Breasted Warbler
Dendroica coronata	Yellow-Rumped Warbler
Dendroica magnolia	Magnolia Warbler
Dendroica palmarum	Palm Warbler
Dendroica pensylvanica	Chestnut-Sided Warbler
Dendroica petechia	Yellow Warbler
Dendroica striata	Blackpoll Warbler
Dendroica tigrina	Cape May Warbler
Dendroica virens	Black-Throated Green Warbler
Geothlypis trichas	Common Yellowthroat
Icteria virens	Yellow-Breasted Chat
Minotilta varia	Black & White Warbler
Opornis formosus	Kentucky Warbler

TABLE C-2 (Cont'd)

Parula americana	Northern Parula Warbler
Seirus aurocapillus	Ovenbird
Seirus noveboracensis	Northern Waterthrush
Setophaga ruticilla	American Redstart
Vermivora celata	Orange-Crowned Warbler
Vermivora peregrina	Tennessee Warbler
Vermivora pinus	Blue-Winged Warbler
Vermivora ruficapilla	Nashville Warbler
Wilsonia pusilla	Wilson's Warbler
Wilsonia canadensis	Canada Warbler

Phasianidae

Phasianus colchicus	Ring-Necked Pheasant

Picidae

Centurus carolinus	Red-Bellied Woodpecker
Colaptes auratus	Common Flicker
Dendrocopus pubescens	Downy Woodpecker
Dendrocopus villosus	Hairy Woodpecker
Dryocopus pileatus	Pileated Woodpecker
Melanerpes erythrocephalus	Red-Headed Woodpecker
Sphyrapicus varius	Yellow-Bellied Sapsucker

Ploceidae

Passer domesticus	House Sparrow

Scolopacidae

Actitis macularia	Spotted Sandpiper
Philohela monor	American Woodcock
Totanus flavipes	Lesser Yellowlegs

Sittidae

Sitta candensis	Red-Breasted Nuthatch
Sitta carolinensis	White-Breasted Nuthatch

Stigidae

Bubo virginianus	Great Horned Owl
Otus asio	Screech Owl
Strix varia	Barred Owl

TABLE C-2 (Cont'd)

Sturnidae	
Sturnus vulgaris	Starling
Sylviidae	
Polioptila caerulea	Blue-Gray Gnatcatcher
Regulus calendula	Ruby-Crowned Kinglet
Regulus satrapa	Golden-Crowned Kinglet
Tochilidae	
Archilochus colubris	Ruby-Throated Hummingbird
Troglodytidae	
Troglodytes aedon	House Wren
Troglodytes troglodytes	Winter Wren
Turdidae	
Hylocichla fuscescens	Veery
Hylocichla guttata	Hermit Thrush
Hylocichla mustelina	Wood Thrush
Hylocichla minima	Gray-Cheeked Thrush
Hylocichla ustulata	Swainson's Thrush
Sialis sialis	Eastern Bluebird
Turdus migratorius	American Robin
Tyrannidae	
Contopus virens	Eastern Wood Peewee
Empidonax mimimus	Least Flycatcher
Myiarchus crinitus	Great Crested Flycatcher
Nutallornis borealis	Olive-Sided Flycatcher
Sayornis phoebe	Eastern Phoebe
Tyrannus tyrannus	Eastern Kingbird
Vireonidae	
Vireo gilvus	Warbling Vireo
Vireo olivaceus	Red-Eyed Vireo
Vireo solitarius	Solitary Vireo

* Compiled by the Waterloo Audubon Society, Waterloo, Iowa

TABLE C-3

Amphibians and Reptiles Occurring in Black Hawk County*

AMPHIBIA

Ambystomidae

Ambystoma laterale	Blue-spotted Salamander
Ambystoma tigrinum	Tiger Salamander

Bufonidae

Bufo americanus	American Toad

Hylidae

Acris crepitans	Cricket Frog
Hyla versicolor	Gray Treefrog
Pseudacris triseriata	Chorus Frog

Ranidae

Rana catesbiana	Bullfrog
Rana pipiens	Leopard Frog

REPTILIA

Chelydridae

Chrysemys picta	Painted Turtle
Chelydra serpentina	Snapping Turtle
Terrapene ornata	Ornate Box Turtle
Trionyx spiniferus	Spiny Soft-shell Turtle
Trionyx muticus	Smooth Soft-shell Turtle

Colubridae

Natix sipedon	Common Water Snake
Storeria dekayi	Brown Snake
Storeria occipitomaculata	Red-bellied Snake
Thamnophis sirtalis	Red-sided Garter Snake
Thamnophis radix	Plains Garter Snake
Diadophis punctatus	Ringneck Snake
Coluber constrictor	Yellow-bellied Racer
Opheodrys vernalis	Smooth Green Snake
Pituophis melanoleucus	Gopher Snake
Lampropeltis triangulum	Milk Snake

* Compiled by Brice, Petrides & Associates, Inc., for Iowa Department of Transportation Interstate 380 study.

AIR QUALITY

The Iowa Department of Natural Resources, Division of Environmental Protection, monitors Iowa's air quality through monitoring stations located throughout Iowa. Most monitors are located in or near areas that are likely to have air quality problems. Waterloo was selected as a monitoring site in 1974. Waterloo has not attained the National Ambient Air Quality Standard (table C-4) for secondary* suspended particulate standards since testing began in 1976.

The only study area are located in the Black Hawk County Nonattainment Area was the Sans Souci Island site; however, flood control measures should not decrease air quality in the Waterloo area.

*In areas where monitored air pollutant concentrations are less than the secondary standards, air is considered to be of good quality and should cause no harm. In areas where monitored values are above the secondary standard but less than the primary standard, air is considered to be of moderate quality and may cause deterioration of environmental surroundings. Monitored air pollutant concentrations exceeding primary standards may pose threats to human health.

SITE CONDITIONS

Hudson, Iowa

Hudson is located adjacent to the floodplain of Black Hawk Creek. Black Hawk Creek is a meandering stream up to 25 feet wide at this location. A variety of aquatic habitats are present.

The floodplain is 1/8 to 3/8 mile across and is classified as palustrine forested wetland on channeled alluvial soils. This bottomland forest is dominated by silver maple, American elm, and green ash, primarily less than 15 inches diameter at breast height (dbh). A fairly dense understory is present. Scattered meander scars are present throughout this area. This unbroken forest corridor constitutes the only significant wildlife habitat in this part of Black Hawk Creek Green Belt.

The alluvial bench adjacent to the forested wetlands is slightly higher in elevation, although still prone to flooding. This land is used primarily as pasture, but large bur oaks and other trees are still present. This has value primarily for deer and species such as squirrels and red-headed woodpeckers associated with the oaks.

TABLE C-4

National Ambient Air Quality Standards

	Primary[1]	Secondary[1]
Total suspended particulate matter (TSP) (standard was replaced by PM_{10} in 1987)	75 $\mu g/m^3$ annual geometric mean 260 $\mu g/m^3$ 24-hour value not to be exceeded more than once per year	150 $\mu g/m^3$ 24-hour value not to be exceeded more than once per year
PM_{10} (July 1, 1987)	50 $\mu g/m^3$ annual mean 150 $\mu g/m^3$ 24-hour average not to be exceeded more than once per year	Same as primary
Sulfur Dioxide	80 $\mu g/m^3$ annual arithmetic mean 365 $\mu g/m^3$ maximum 24-hour concentration not to be exceeded more than once per year	1300 $\mu g/m^3$ maximum 3-hour concentration not to be exceeded more than once per year
Ozone (as revised February 8, 1979)[2]	0.12 ppm (235 $\mu g/m^3$) 1-hour average concentration not to be exceeded more than once per year	Same as primary
Carbon Monoxide	9 ppm (10 mg/m^3) maximum 8-hour concentration not to be exceeded more than once per year 35 ppm (40 mg/m^3) maximum 1-hour concentration not to be exceeded more than once per year	Same as primary
Nitrogen dioxide	0.053 ppm (100 $\mu g/m^3$) annual arithmetic mean	Same as primary
Lead (October 5, 1978)	1.5 $\mu g/m^3$ maximum arithmetic mean averaged over a calendar quarter	Same as primary

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[1] Primary standards are set to protect public health and secondary standards to protect public welfare.

[2] The initial promulgation included photochemical oxidants and hydrocarbons. The photochemical oxidant standard was revised to ozone in 1979 because the preponderence of photochemical oxidants measured is ozone. The hydrocarbon standard was deleted in 1982. The hydrocarbon measurements included all organic compounds. Hydrocarbons were measured as a precursor to ozone, but only reactive organic compounds take part in the photochemical reaction producing ozone. The term "hydrocarbon" has been dropped and replaced with the term "volatile organic compounds" (VOC) because not all hydrocarbons are reactive.

Iowa Nonattainment Area Designations (1978)

County	Primary TSP	Secondary TSP	Ozone[1]	CO	SO_2
Black Hawk		P			
Clinton	P	P			
Lee	P				
Linn	P				
Marshall		P			
Muscatine		P			
Polk	P	P		P	
Pottawatamie	P				
Scott	P	P			
Webster	P				
Woodbury	P				
Dubuque					P
Cerro Gordo	P				

P—Partial
W—Whole county

[1] Linn, Polk, Scott, and Pottawatamie Counties were designated nonattainment but were removed from the list when EPA revised the ozone standard in 1979.

Dunkerton

The town of Dunkerton is located in the floodplain of Crane Creek, with the town being 100 to 200 feet from the creek in some locations. It experienced major flooding in 1968 and 1990.

Crane Creek is approximately 25 to 35 feet in width and up to 3 feet in depth. Aquatic habitat diversity is high.

Floodplain areas consist of palustrine forested wetland, dominated by American elm, green ash, silver maple, and box elder. Scattered red oak, shagbark hickory, and black cherry are present on small ridges in the floodplain. The understory is dense and is dominated by gooseberry, blackberry, and honeysuckle. Old channel habitat with standing water is present both east of the highway and west of the railroad tracks.

A city park, which has numerous large trees and a small pond, is located north of Crane Creek between the highway and the railroad track. Wildlife values for the park are fairly low due to its developed nature.

Evansdale - Elk Run Heights

A portion of undeveloped land in the city of Evansdale is located in the floodplain of Elk Run Creek. Elk Run Heights receives little or no flooding from the creek, which is a relatively small, meandered stream with a channel 10 to 15 feet in width. Instream cover is excellent, with abundant fallen trees and pools.

Palustrine forested wetland on channeled loamy alluvial soil is present along the creek. Tree composition is green ash, American elm, and silver maple, with scattered hackberry and oak. A well-developed understory of gooseberry, blackberry, and honeysuckle also is present. Most of the trees are pole-sized, with a few larger individuals up to 40 inches dbh. Oak dominates the adjacent hillsides. These habitats act as a corridor for wildlife movement between the Cedar River and rural areas north of Evansdale.

An area to the east of the creek that is slightly higher in elevation, but still within the floodplain, is presently in agricultural fields or part of a Black Hawk County-managed park. Bunger Park, a small city-managed park, also is located on the west bank of Elk Run Creek.

Cedar City - North Cedar

An extensive tract of relatively undeveloped Cedar River floodplain lies directly to the south of North Cedar. The floodplain is forested palustrine wetland with numerous oxbows and old channels which contain water on a semi-permanent basis.

A variety of tree species, including honey locust, swamp white oak, box elder, green ash, cottonwood, hackberry, silver maple and American elm, mostly 30-40 years old, are present. A University of Northern Iowa Nature Preserve and Island Park, which is partly developed, are located in the floodplain west of Highway 218. East of Highway 218, some natural forested wetland and oxbows remain, but a number of lakes have been excavated by a sand mining operation. Other areas have been filled and are used for disposing of concrete and trees. All of this forested wetland has high wildlife values, but it is particularly valuable for species such as wood ducks, great blue herons, and amphibians, due to the large amount of shallow water habitat available.

The Cedar River provides the primary aquatic habitat in this area. It has been significantly altered at this site by several low head dams and construction activities.

Sans Souci Island

Sans Souci Island is a large island of palustrine forested wetland, about 160 acres in size, located in the Cedar River. It is densely forested with mature bottomland hardwoods. Tree species consist of cottonwoods, silver maple, green ash, and box elder. Only a very narrow riparian strip is present along the mainland banks.

The aquatic habitat present consists of the two channels of the Cedar River. The south channel was partially closed several years ago with a notched closing dam. This dam was constructed in an effort to divert flow into the north channel to scour out sediment deposits. The dam was notched to maintain water flow through the south channel. Flow in the north channel is relatively slow moving, and the bottom substrates consists of fine sediments. Flow in the south channel is faster moving and a rocky substrate is present.

CULTURAL RESOURCES

GENERAL

A number of locations are under study to investigate possible solutions to reduce flood damages. The preliminary cultural resource investigation was conducted prior to the development of any specific proposals for the areas of study due to the necessity of undertaking fieldwork prior to the onset of winter weather. Four locations were chosen for preliminary cultural resource investigation following a preliminary visit by Corps of Engineers personnel to a number of potential study sites in Black Hawk County. These four locations were chosen for their likely potential for warranting further study. They are Hudson, Dunkerton, Cedar City-North Cedar, and Evansdale-Elk Run Heights.

PREVIOUS INVESTIGATIONS

The Iowa Office of the State Archaeologist was contracted to provide United States Geological Survey, 7.5-minute map locations for known sites and for areas of previous survey. Survey areas were identified on the maps using the nine-digit project code.

Five previous surveys of various sizes have been conducted in the Hudson vicinity, resulting in three sites being located within one-half mile of the current study area.

No previous cultural resource investigations have been undertaken in the Dunkerton vicinity.

Two projects in the Cedar City-North Cedar vicinity located three sites in the general area of the present study. The U.S. Army Engineer District, Rock Island (1976), report entitled, *Interim Review of Reports for Flood Control, Iowa and Cedar Rivers, Iowa and Minnesota, Cedar Falls, Iowa*, considered potential levee alignments in the Cedar City-North Cedar area but included no consideration of cultural resource issues.

In the Evansdale-Elk Run Heights vicinity, Espey, Huston, and Associates, Inc. (1979), conducted a cultural resource survey for the Corps' Evansdale, Iowa, Local Flood Control Protection Project. This work was all for levee construction on the west side of Elk Run Creek, while the present study is for possible protection on the east side of the creek. Six additional projects are in close proximity to the present study alignment, with one site being recorded west of Elk Run Creek.

PRELIMINARY CULTURAL RESOURCE INVESTIGATION

The preliminary cultural resource investigation focused on areas where harvested fields had been rain-washed and where crop residue left at least 15 percent ground visibility. Because harvest was in progress or had recently been completed, these conditions were met in only a few instances. More importantly, modern development was extensive throughout the four areas, thereby limiting ground visibility. Shovel testing in these locations was not emphasized in the investigation due to the limited scope of the present study.

The combined area for the two surveyed parcels in the current investigation is approximately 9.1 acres. One previously unrecorded scatter of historic debris was located (site 13BH87).

Hudson Vicinity

The town of Hudson lies southwest of Waterloo, Iowa, on the east bank of Black Hawk Creek. Previous survey areas reflect five projects conducted between 1976 and 1989. Three archeological sites (13BH79, 13BH80, and 13BH82) are located within one-half mile of Black Hawk Creek and within the general area of the upstream and downstream limits of current potential project alignments.

Pedestrian survey was conducted on 9 acres by walking in intervals spaced approximately 6 meters apart in a field just southwest of a cemetery at the edge of Hudson. Soybeans had been recently harvested from the field. It was well rain-washed but had only 15 percent ground visibility due to crop residue. A light scatter of unmodified glacial cobble was present on the higher elevations. Seven items of historic debris were found over an area of approximately 5 acres.

The limited visibility and widely scattered nature of the debris indicates the need to survey the area under better visibility conditions.

Dunkerton Vicinity

Dunkerton lies south of Crane Creek in the northeastern part of Black Hawk County. A significant portion of the town is subject to flooding.

Absence of ground visibility precluded pedestrian survey. However, a concrete arch bridge lies within the current project alignment and may be eligible for inclusion in the National Register.

Photographs of the bridge were included in the January 1991 report to the State Historic Preservation Officer. The bridge is currently limited to

pedestrian traffic due to its structural condition. It provides access from Dunkerton to a city park on the opposite side of the creek.

Van Metre (1904:85) notes that a "bridge over Crane Creek at Dunkerton was built in 1894 by the Hannibal Company at a cost of $3,800." Although the bridge plaque has been removed, it is almost certain that this is the bridge in Van Metre's reference.

Cedar City-North Cedar Vicinity

Cedar City and North Cedar lie on the north bank of the Cedar River opposite Cedar Falls. Extensive housing and commercial development exists throughout the area, including numerous sand pits lying between the two towns.

Previous survey areas reflect two projects from 1985 and 1989 which recorded three archeological sites (13BH64, 13BH77, and 13BH78) within the vicinity of the current study. The U.S. Army Engineer District-Rock Island (1976) report studied potential levee alignments in the Cedar City and North Cedar area, but cultural resource issues were not addressed.

No ground visibility was present along the current project alignment.

A shovel test was placed near the sand pits on one small area that appeared to be undisturbed by quarrying. This test measured 40 centimeters in diameter and 25 centimeters deep, with all fill being passed through 1/4-inch hardware cloth. Because the soil was a compact clay with coarse sand and hundreds of small water-worn pebbles, digging was extremely difficult. No cultural material was found. A one-inch soil probe was used to pull a core from 25 to 55 centimeters below the surface before it refused in the compact clay. The core produced a uniform clay with pebbles just as in the upper 25 centimeters. Although the soil appears to be undisturbed by quarrying, its compact nature may indicate substantial equipment traffic related to quarrying.

Other similar, minimally disturbed areas may exist among the sand pits and may retain some potential for containing cultural resources.

Western Historical Company (1878:309) references activities of G. Paul Somaneux, who in the "Winter of 1848-49, made a claim and built a cabin where the village of Cedar City now stands...[and] died at his cabin in the Fall of 1850, and was buried on the bank of the slough, near by."

Although no evidence of Somaneux's activities or burial may remain in the archeological record, narrow margins along the slough edges do appear to be areas of the least modern disturbance and would likely be most impacted by any potential levee construction should such a recommendation be made.

Evansdale-Elk Run Heights Vicinity

Evansdale and Elk Run Heights lie just southeast of Waterloo, Iowa, and northeast of the Cedar River. The area between the two towns contains the Elk Run Heights Park, the KWWL radio towers, and a moderate acreage of agricultural land.

Seven previous surveys dating between 1974 and 1986 are within a 1-mile radius of the current project alignment. One of these was conducted for the Corps (Espey, Huston, and Associates, Inc., 1979). One previously located site (13BH29) lies just across Elk Run Creek from the current project alignment.

Pedestrian survey was limited to a field road west of the KWWL radio towers. The ground visibility was near 80 percent with well rain-washed soil. No cultural materials were found within this area containing approximately 0.1 acre.

POTENTIAL ENVIRONMENTAL IMPACTS OF ALTERNATIVES

NO FEDERAL ACTION

No significant impacts to natural resources or historic properties would be expected if no action is taken.

NONSTRUCTURAL ALTERNATIVES

Nonstructural alternatives would include such measures as floodproofing, evacuation and relocation, or development of flood forecasting and warning systems. No significant impacts to natural resources would be anticipated to result from these actions. Some impacts to property values, public facilities, or possibly to historic properties could occur if these measures were undertaken.

STRUCTURAL ALTERNATIVES

Alternatives involving landscape modification or construction of new structures could affect natural and cultural resources or economic and social concerns. Impacts to natural terrestrial resources are not anticipated to be significant for levees and floodwalls due to the degree of urbanization in the project area. Channel modification could result in significant adverse impacts to aquatic resources. Upland soil and water conservation

measures could benefit land resources and water quality in the surrounding region.

FUTURE STUDY REQUIREMENTS

An Environmental Assessment (EA) will be prepared as part of the Feasibility Phase study. This document will contain analyses of impacts of proposed projects and alternatives on natural and cultural resources and on social and economic concerns. These analyses are expected to include survey of any levee alignments and proposed borrow areas for habitat suitable for the blue-spotted salamander and, if necessary, for the presence of salamanders.

Any area within the current reconnaissance study that may have specific proposals recommended as viable solutions to reducing flood damages will need intensive archeological, geomorphological, and architectural investigation focusing upon the specific impacts of any recommended solutions.

All areas studied for cultural impacts in the present investigation contain landforms with the potential for buried cultural resources as well as for surface sites with historical or archeological significance. Each of the areas also has the potential to impact standing structures that may be locally or regionally significant.

Of particular concern would be the concrete arch bridge in Dunkerton. Whether or not it may be determined eligible for the National Register, it is a locally important resource for the community, providing easy pedestrian access to the park on the north side of Crane Creek. Efforts to preserve this access should be considered in project planning.

The preliminary cultural resource investigation documents the need for intensive Phase I survey (including architectural survey) and limited geomorphological testing for any project alternatives now under study that may be recommended as possible solutions to reduce flood damages in the area.

Continued coordination will be maintained with interested agencies such as the U.S. Fish and Wildlife Service, the Iowa Department of Natural Resources, the State Historic Preservation Officer, the U.S. Environmental Protection Agency, and others.

REFERENCES CITED

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APPENDIX D

SUMMARY OF PRELIMINARY COSTS

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

APPENDIX D
SUMMARY OF PRELIMINARY COSTS

TABLE D-1

Preliminary Costs for 100-Year Protection
Crane Creek, Dunkerton, Iowa

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Levee/Floodwall				
Embankment	34,500	CY	5.25	181,125
Stripping	4,300	CY	1.25	5,375
Stripping (Waste)	2,150	CY	6.00	12,900
Inspection Trench	12,500	CY	2.50	31,250
Seeding	5.8	AC	1,875.00	10,875
Ramps (Sta. 9+10W)				
Embankment	200	CY	5.75	1,150
Surfacing	50	CY	30.00	1,500
Ramps (Sta. 1+20E)				
Embankment	200	CY	5.75	1,150
Surfacing	40	CY	30.00	1,200
Ramps (Sta. 5+50E)				
Embankment	200	CY	5.75	1,150
Surfacing	40	CY	30.00	1,200
Floodwalls				
T-Wall (9+55W-12+30W)				
Concrete	132	CY	360.00	47,520
Excavation	118	CY	3.00	354
Backfill	55	CY	5.00	275
I-Wall (13+30W-18+76.5W)				
Concrete	300	CY	300.00	90,000
Excavation	840	CY	1.60	1,344
Backfill	540	CY	3.10	1,674
Sheetpiling	6,340	SF	15.25	96,685
Filter Material	547	LF	23.75	12,991
I-Wall (2+30E-4+04E)				
Concrete	75	CY	300.00	22,500
Excavation	260	CY	1.60	416
Backfill	170	CY	3.10	527
Sheetpiling	1,390	SF	15.25	21,197

TABLE D-1 (Cont'd)

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Levee/Floodwall (Cont'd)				
Filter Material	174	LF	23.75	4,132
R.R. Sandbag Closure Sheetpiling	260	SF	20.00	5,200
R.R. Sandbag Closure Sheetpiling	260	SF	20.00	5,200
Subtotal				558,890
Contingency (25%)				139,723
Total for Levee/Floodwalls				698,613
Channel Improvement				
Excavation	14,800	CY	2.50	37,000
Disposal	14,800	CY	6.75	99,900
Seeding	3.8	AC	1,875.00	7,125
Ditch Excavation	3,400	CY	3.25	11,050
Seeding	1.2	AC	1,875.00	2,250
Clearing & Grubbing Channel, Levee, & Ditch	5	AC	4,500.00	22,500
Subtotal				179,825
Contingency (25%)				44,956
Total for Channel Improvement				224,781
Interior Drainage				
Outlet Drainage (Sta. 1+50W)				
Concrete Pipe	80	LF	220.00	17,600
Gatewell & Gate	1	JOB	SUM	46,000
Outlet Drainage (Sta. 3+70E)				
Concrete Pipe	25	LF	75.00	1,875
Gatewell & Gate	1	JOB	SUM	21,000
Outlet Drainage (Sta. 8+10E)				
Concrete Pipe	74	LF	51.00	3,774
Gatewell & Gate	1	JOB	SUM	13,200
Subtotal				103,449
Contingency (25%)				25,862
Total for Interior Drainage				129,311

TABLE D-1 (Cont'd)

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Utilities				
Sanitary Sewer Main (0+70W)				
Remove Sewer Pipe	1	JOB	SUM	2,700
Replace Over Levee	122	LF	20.00	2,440
Levee Embank. Over Pipe	300	CY	7.50	2,250
Subtotal				7,390
Contingency (25%)				1,848
Total for Utilities				9,238

Summary of Costs (Rounded):

Total for Levee/Floodwall	698,600
Total for Channel Improvement	224,800
Total for Interior Drainage	129,300
Total for Utilities	9,200
Subtotal	1,061,900
Engineering & Design (14%)	148,700
Supervision & Administration (9%)	95,600
Total First Cost	1,306,200

TABLE D-2

Preliminary Costs for 100-Year Protection
North Cedar, Iowa

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Impervious Levee				
Embankment	241,100	CY	5.20	1,253,720
Stripping	20,300	CY	1.25	25,375
Stripping (Waste)	10,500	CY	6.00	63,000
Inspection Trench (8')	28,000	CY	2.50	70,000
Inspection Trench (18")	4,000	LF	1.50	6,000
Seeding	25	AC	1,950.00	48,750
Ramps (Sta. 76+50)				
Embankment	100	CY	6.00	600
Granular Surfacing	20	CY	36.50	730
Asphalt Surfacing	100	SY	5.25	525
Ramps (Sta. 16+00)				
Embankment	1,500	CY	6.00	9,000
Granular Surfacing	160	CY	36.50	5,840
Asphalt Surfacing	730	SY	5.25	3,833
Road Surfacing (76+50-87+20)				
Granular Surfacing	530	CY	36.50	19,345
Asphalt Surfacing	2,370	SY	5.25	12,443
Road Surfacing (103+10-107+90)				
Granular Surfacing	240	CY	30.00	7,200
Subtotal				1,526,361
Contingency (25%)				381,590
Total for Levee				1,907,951
Interior Drainage				
Gatewell & Gate (Sta. 0+50)	1	JOB	SUM	22,500
Gatewell & Gate (Sta. 0+60)	1	JOB	SUM	22,500
Gravity Outlet (Sta. 83+50)				
Gatewell & Gate	1	JOB	SUM	43,600
Concrete Outlet Struct.	127	LF	246.00	31,242
5,000 GPM Temporary Pump	1	JOB	SUM	41,600
Temporary 5,000 GPM Pump at Sta. 43+00	1	JOB	SUM	41,600
Subtotal				203,042
Contingency (25%)				50,760
Total for Interior Drainage				253,802

TABLE D-2 (Cont'd)

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Utilities				
Sanitary Sewer (Sta. 15+90)				
Gatewell & Gate	1	JOB	SUM	10,600
Concrete Pipe	73	LF	29.00	2,117
Sanitary Sewer (Sta. 35+00)				
Gatewell & Gate	1	JOB	SUM	13,000
Concrete Pipe	100	LF	70.00	7,000
Subtotal				32,717
Contingency (25%)				8,179
Total for Utilities				40,896

Summary of Costs (Rounded):

Total for Levee	1,908,000
Total for Interior Drainage	253,800
Total for Utilities	40,900
Subtotal	2,202,700
Engineering & Design (14%)	308,400
Supervision & Administration (9%)	187,200
Total First Cost	2,698,300

TABLE D-3

Preliminary Costs for 100-Year Protection
West Cedar City, Iowa

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Impervious Levee				
Embankment	87,100	CY	5.20	452,920
Stripping	12,500	CY	1.25	15,625
Stripping (Waste)	6,250	CY	6.00	37,500
Inspection Trench	12,900	CY	2.50	32,250
Seeding	9.2	AC	1,950.00	17,940
Ramp				
Embankment	600	CY	6.00	3,600
Granular Surfacing	90	CY	36.50	3,285
Asphalt Surfacing	400	SY	5.25	2,100
Subtotal				565,220
Contingency (25%)				141,305
Total for Levee/Floodwall				706,525
Interior Drainage				
Outlet Structure				
Concrete Box	137	LF	310.00	42,470
Gatewell & Gate	1	JOB	SUM	29,000
Temporary Pumping	1	JOB	SUM	64,000
Subtotal				135,470
Contingency (25%)				33,868
Total for Interior Drainage				169,338
Utilities				
Sanitary Sewer (Sta. 18+40)				
Gatewell & Gate	1	JOB	SUM	15,100
Concrete Pipe	88	LF	84.00	7,392
Sanitary Sewer (Sta. 42+60)				
Gatewell & Gate	1	JOB	SUM	15,200
Concrete Pipe	79	LF	84.00	6,636
Subtotal				44,328
Contingency (25%)				11,082
Total for Utilities				55,410

Summary of Costs (Rounded):

Total for Levee/Floodwall	706,500
Total for Interior Drainage	169,300
Total for Utilities	55,400
Subtotal	931,200
Engineering & Design (14%)	130,400
Supervision & Administration (9%)	83,800
Total First Cost	1,145,400

TABLE D-4

Preliminary Costs for 100-Year Protection
Cedar City, Iowa

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Levee/Floodwall				
Embankment	245,600	CY	5.20	1,277,120
Stripping	20,800	CY	1.25	26,000
Stripping Waste	10,400	CY	6.00	62,400
Inspection Trench	30,300	CY	2.50	75,750
Seeding	26	AC	1,950.00	50,700
Ramps (Sta. 33+00)				
Embankment	80	CY	6.00	480
Granular Surfacing	55	CY	36.50	2,008
Asphalt Surfacing	248	SY	5.25	1,302
Ramps (Sta. 58+50)				
Embankment	2,100	CY	6.00	12,600
Granular Surfacing	200	CY	36.50	7,300
Asphalt Surfacing	900	SY	5.25	4,725
Ramps (Sta. 82+70)				
Embankment	1,000	CY	6.00	6,000
Granular Surfacing	160	CY	36.50	5,840
Asphalt Surfacing	720	SY	5.25	3,780
Floodwall (1+55-11+95)				
Concrete	728	CY	270.00	196,560
Excavation	1,620	CY	1.60	2,592
Backfill	1,030	CY	3.10	3,193
Sheetpiling	16,640	SF	15.25	253,760
Filter Material	1,040	LF	23.75	24,700
Floodwall (55+00-57+05)				
Concrete	144	CY	270.00	38,880
Excavation	280	CY	1.60	448
Backfill	170	CY	3.10	527
Sheetpiling	3,325	SF	15.25	50,706
Filter Material	175	LF	23.75	4,156
RD. Closure Structure (55+48-55+80)	304	SF	410.00	124,640
R.R. Closure Structure (67+40-67+72)	208	SF	325.00	67,600
Subtotal				2,303,767
Contingency (25%)				575,942
Total for Levee/Floodwall				2,879,709

TABLE D-4 (Cont'd)

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Interior Drainage				
Outlet Structure Station	163	LF	130.00	21,190
Gatewell & Gate	1	JOB	SUM	28,600
15,700 GPM Temp. Pump Sta.	1	JOB	SUM	64,000
Subtotal				113,790
Contingency (25%)				28,448
Total for Interior Drainage				142,238
Utilities				
Sanitary Sewer (Sta. 19+30)				
Gatewell & Gate	1	JOB	SUM	11,400
Concrete Pipe	126	LF	43.80	5,519
Sanitary Sewer (Sta. 59+00)				
Gatewell & Gate	1	JOB	SUM	11,150
Concrete Pipe	120	LF	40.30	4,835
Subtotal				32,905
Contingency (25%)				8,226
Total for Utilities				41,131

Summary of Costs (Rounded):

Total for Levee/Floodwall	2,879,700
Total for Interior Drainage	142,200
Total for Utilities	41,100
Subtotal	3,063,000
Engineering & Design (14%)	428,800
Supervision & Administration (9%)	275,700
Total First Cost	3,767,500

TABLE D-5

Preliminary Costs for 100-Year Protection
East Cedar City, Iowa

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Levee/Floodwall				
Embankment	134,300	CY	5.20	698,360
Stripping	9,700	CY	1.25	12,125
Stripping (Waste)	4,900	CY	6.00	29,400
Inspection Trench	13,700	CY	2.50	34,250
Seeding	12.5	AC	1,950.00	24,375
Ramp				
Embankment	1,800	CY	6.00	10,800
Granular Surfacing	190	CY	36.50	6,935
Asphalt Surfacing	850	SY	5.25	4,463
Concrete Wall (7+40-8+40)				
Concrete	70	CY	270.00	18,900
Excavation	160	CY	1.60	256
Backfill	99	CY	3.10	307
Sheetpiling	1,600	SF	15.25	24,400
Filter Material	100	LF	23.75	2,375
Concrete Wall (8+40-9+75)				
Concrete	340	CY	350.00	119,000
Excavation	570	CY	4.25	2,423
Backfill	320	CY	4.50	1,440
Filter Material	135	LF	23.75	3,206
Subtotal				993,015
Contingency (25%)				248,254
Total for Levee/Floodwall				1,241,269
Interior Drainage				
Outlet Structure (Sta. 14+80)				
36" RCP	190	LF	104.00	19,760
Gatewell & Gate	1	JOB	SUM	20,600
3,600 GPM Temp. Pump Sta.	1	JOB	SUM	41,600
Subtotal				81,960
Contingency (25%)				20,400
Total for Interior Drainage				102,360

TABLE D-5 (Cont'd)

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Utilities				
Sanitary Sewer (Sta. 1+50)				
Gatewell & Gate	1	JOB	SUM	10,700
Concrete Pipe	145	LF	40.00	5,800
Subtotal				16,500
Contingency (25%)				4,100
Total for Utilities				20,600

Summary of Costs (Rounded):

Total for Levee/Floodwall	1,241,300
Total for Interior Drainage	102,400
Total for Utilities	20,600
Subtotal	1,364,300
Engineering & Design (14%)	191,000
Supervision & Administration (9%)	122,800
Total First Cost	1,678,100

APPENDIX E

RECREATION FACILITIES CHECK LIST

RECREATION FACILITIES CHECK LIST

Activity/Facility	Joint Cost 2/	Cost Shared 3/	100% Other 4/
I. Access and Circulation			
Roads 5/		x	x
Turnarounds	x	x	x
Trails			
Hiking		x	x
Exercise			x
Bicycle/Jogging		x	x
Equestrian/without jumps		x	x
Snowshoe		x	x
Cross County Ski		x	x
Ski Slopes			x
Chairlifts/Tows			x
Snowmobile		x	x
Off-Road Vehicles		x	x
Water		x	x
Slalom			x
Artificial White Water			x
Parking 5/		x	x
Bridges and Culverts		x	x
Boat Launching Devices			
Mechanical			x
Surfaced Ramps	x	x	x
Boat Piers (Fixed or Floating)		x	x
Walks		x	x
Steps (Outdoor)		x	x
Pedestrian Ramps		x	x
Fishing piers and attendant facilities		x	x
Footbridges 9/		x	x
II. Structures			
Sanitation			
Vault Toilets	x6/	x	x
Comfort Station	x6/	x	x
Comfort Station w/showers		x	x
Laundry Room			x
Bath-Changehouse		x	x
Fish Cleaning Station		x	x

Activity/Facility	Joint Cost	Cost Shared	100% Other
Boat Storage			x
Employee Quarters			x
Bulk Storage			x
III. Utilities			
Water Supply			
Municipal System		x	x
Wells		x	x
Treatment Plant		x	x
Storage		x	x
Distribution		x	x
Fountain and Outlets		x	x
Irrigation System (manual)		x	x
Irrigation System (automatic)			x
Camp Site Hook-ups		x	x
Sewage and Waste Water Disposal			
Municipal System		x	x
Septic Tanks and Tile Fields		x	x
Treatment Plants		x	x
Oxidation Lagoon		x	x
Sanitary Dump Station (Boats and Camping Trailers)		x	x
Camp Waste Water and Garbage Disposal		x	x
Storm Drainage		x	x
Public Telephone		x2/	x
Electrical			
Lighting		x	x
Lift Pumps		x	x
Camp Site Hook-ups		x	x
Gas, Natural/Propane		x	x
Land Fill			x
Incinerator			x
IV. Site Preparation and Restoration			
Clearing and Grubbing (Includes vista clearing)		x	x
Grading and Land Form		x	x
Tree Planting		x	x
Shrub Planting		x	x
Other Planting (Perennial, etc.)		x	x

Activity/Facility	Joint Cost	Cost Shared	100% Other
VIII. Interpretive Guidance and Media			
Display Boards		x	x
Display Cases			x
Interpretive Markers (Natural, Historical Archeological, etc.)		x	x
Electronic Audio-Visual Devices			x
Exhibit Space			x
Bulletin Boards		x	x
IX. Protection, Control, Health and Safety			
Protection and Control Gates and Barricades	x	x	x
Cattle Guards		x	x
Walls and Fencing		x	x
Guardrails	x	x	x
Breakwaer-fishing walkways		x	x
Entrance Stations		x	x
Buoys/Waterways Markers		x	x
Fire Fighting and Protection			x
Communication			x
Vandalism and Theft Control Devices			x
Campground Registration Box			x
Health and Safety			
Lighting		x	x
Life Guard Stand (Where life guard services are authorized)			x
First Aid Station			x
Handrails		x	x

Activity/Facility	Joint Cost	Cost Shared	100% Other
Shelters			
Picnic		x	x
Overlook		x	x
Trail		x	x
Group Camp			
Cabins and Dormitories			x
Dining Hall			x
Infirmaries			x
Amphitheaters		x	x
Caretaker Quarters			x
Outdoor Cooking		x	x
Beaches		x	x
Docks		x	x
Camping pads		x	x
Swimming Beaches		x	x
Visitor Center	x2/		x
Nature Center			x
Historical Centers			x
Archeological Centers			x
Environmental-Education Centers			x
Lodges/Cabins			x
Hotels/Motels			x
Restaurants/Snack Bars			x
Stores/Commissaries			x
Bait/Tackle Shops			x
Marina			x
Docks/Piers			x
Fuel Dispensing/Storage			x
Repair Facilities			x
Storage Facilities			x
Swimming Pools			x
Clubhouse			x
Stables			x
Corrals			x
Equestrian Jumps/Courses			x
Fountains/Statuary			x
Decorative Lakes/Ponds			x
Decorative Promenades			x
Maintenance and Operation			
Vehicle and Material Storage			x
Garages			x
Work Shops			x
Utility Buildings			x
Inflammable Storage			x
Administrative Facilities			x
Gate House, Control Structures			x

Activity/Facility	Joint Cost	Cost Shared	100% Other
Turf Establishment		x	x
Reforestation		x	x
V. Park Furniture			
Picnic Tables		x	x
Grills and Fireplaces		x	x
Campfire Circles		x	x
Trash Receptacles/Holders		x	x
Benches		x	x
Camping Pads		x	x
Flag Poles			x
Lantern Hangers		x	x
VI. Play Facilities			
Courts			
Multiple Use		x7/	x
Tennis			x
Basketball			x
Handball			x
Shuffleboard			x
Volleyball			x
Horseshoe-Pits			x
Sports/Play Fields			
Baseball Diamond with Backstop		x	x
Bleachers			x
Dugouts			x
Fencing			x
Lighting			x
Playfield Area (open space)		x	x
Marking/Goals			x
Play Equipment			
Standard		x	x
Elaborate 8/			x
Golf Course/Putting Greens			x
VIII. Signs			
Entrance-Directoral-Marked		x	x
Traffic Control (Vehicular and Pedestrian)		x	x
Instruction (Includes Fire Danger Notices)		x	x

1/ Includes new and completed lakes, local protection projects, navigation projects, etc. Facilities not listed must be justified and approved prior to commitments made to cost sharing partners. This check list will be modified as appropriate.

2/ The facilities to be provided are to be limited to those required for minimum health and safety; beyond these the Corps will also provide type "C" visitor center and operational boat ramps. Handicapped access will be a consideration.

3/ Facilities to be cost shared are limited to standard designs that do not include embellishments such as decorative stone work, planters, elaborate designs or pretentious space.

4/ Includes facilities which may not be resource oriented, are revenue producing or are over and above that which would normally be provided at a water resource project.

5/ When roads and/or parking are to be used and/or designed for use under more than one financing category, cost will be allocated on the basis of estimated use by function. The discretion of the D.E. is to be applied.

6/ Minimum sanitary facilities are limited to those that meet minimum Federal and local health requirements.

7/ Grading and paving, to the extend they represent least cost alternatives to stabilizing floodways, may be used by local interests for recreational activities or facility developments not eligible for cost sharing. Such grading and paving may be done by the Corps to specifications more costly than necessary for floodway stabilization provided the additional cost is met by a non-Federal sponsor.

8/ Includes extensive specialized play equipment over and above basic climbing, swinging and sliding apparatus.

9/ Footbridges are to be austere and used only when other crossing methods are impractical. Footbridges which are the center of a recreation experience are to be at local costs.

APPENDIX F

PERTINENT CORRESPONDENCE

RECONNAISSANCE REPORT

CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

APPENDIX F
PERTINENT CORRESPONDENCE

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CEDAR VALLEY
LAKES

February 16, 1990

Mr. Charles Farnham
Chief, Flood Control & Special
Studies Branch
U.S. Army Engineer District, Rock Island
Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, IL 61204-2004

Dear Chuck:

On behalf of the Cedar Valley Lakes Board of Directors, let me begin by thanking you and George Gitter for meeting with us on January 31, 1990. Your assistance and cooperation were greatly appreciated.

As much was discussed in that meeting, we thought it advisable to convey to you our understanding of mutual agreement issues and seek your review and concurrence. Therefore, I have listed below the elements that we understand will serve as major components and emphasis areas of the Black Hawk County Study:

1. The focus area of the study will be the Cedar Valley Lakes Project Area.
2. Potential for assistance to flood-prone residential and commercial areas and the availability of financial aid for that assistance.
3. Emphasis on non-structural alternatives for floodplain management including analysis of cost effectiveness of removing incompatible development.
4. Potential for secondary recreational benefits from a non-structural floodplain plan such as a series of greenway cooridors linking parts of the Cedar Valley Lakes project through some of the more developed areas in North Cedar.
5. Potential for flood protection in the proposed and existing lake areas within the Cedar Lakes area for fishery and recreational management.
6. Potential impacts on lakes area from Cedar Falls flood protection project.
7. Potential of using borrow from west lake area for Cedar Falls flood dike.

[illegible] Fourth Street
[illegible], Iowa 50[illegible]
(319) 232 11[illegible]

8. Potential from any future corp project for having an impact upon the Cedar Valley Lakes Project.
9. Analysis of potential development areas within the lakes area, especially those already selected.
10. Channel configuration/alignment analysis for determining whether or not to intercede in resisting or enhancing the change.
11. Potential for restoration, enhancement, or development of wetlands within the area.
12. Analysis, from a boating and hydrological standpoint, of potential lake connections, or enhancement of existing lake connections, to the Cedar River.

Additional items for review have also been discussed since our January meeting and I would submit them for your consideration. All topics would be evaluated as they relate to and/or affect flood protection:

1. Analysis of clarity and quality of water to be found in proposed West Lake. Emphasis on runoff potential and underground flow characteristics as impacted by Cedar Falls dump site and adjacent residential septic systems.
2. Impact of Cedar Falls Dump Site.
3. Sewer and water capacity for identified future development sites.

We are anxious to assist you in any way that you deem appropriate so that the above stated list of components may be accomplished. Enclosed, please find the rosters for the Cedar Valley Lakes Board and Technical Committee. You will receive meeting notices for these groups and are truly welcome to attend the meetings. They are normally scheduled for the first Tuesday of every month. Additionally, we would be pleased to host a special meeting for Colonel John R. Brown, Congressman Dave Nagle, and the Cedar Valley Lakes Board. Please advise when you believe this meeting would be appropriate.

Again, thank you for your assistance. Your willingness to work with us and your enthusiasm for the project will surely result in a productive partnership.

Sincerely,

Sharon Juon
Executive Director
Iowa Northland Regional
Council of Governments

SJ:jb

Enclosure

cc: John Miller, Congressman Nagle's Office
Rick Young, Cedar Valley Lakes
Gerry Schnepf, Iowa Natural Heritage Foundation
Mike Carrier, Department of Natural Resources

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF:

March 29, 1990

Planning Division

Ms. Sharon Juon
Executive Director
Iowa Northland Regional
Council of Governments
10 W. Fourth Street
Waterloo, Iowa 50701

Dear Ms. Juon:

I am writing in response to your letter dated February 16, 1990, concerning the Black Hawk County, Iowa, Reconnaissance Study and Cedar Valley Lakes area. The initiation of the Black Hawk County Reconnaissance Study has been delayed until July 1, 1990. This delay is the result of a reallocation of study management personnel within Planning Division due to critical vacancies and a Federal hiring freeze.

I would like to discuss each of the elements you listed as major components and emphasis areas for the reconnaissance study:

Item 1: The study area encompasses Black Hawk County in its entirety and flood damage reduction is the primary purpose of the study. In the authorizing resolution by the House Committee on Public Works and Transportation, adopted September 8, 1988, recommendations for water and recreation development also are specified for review in the Black Hawk County Study. An appropriate level of review will be accomplished during the reconnaissance study. The objective of a reconnaissance study is to determine current problems and if there are possible solutions that are economically justified, and engineeringly and environmentally sound, that warrant further Federal consideration.

Item 2: Assistance to flood-prone areas would be investigated as part of the reconnaissance study process.

Item 3: During the reconnaissance study, nonstructural measures, such as flood warning and preparedness, flood-proofing, evacuation, and/or relocation of structures would be formulated and evaluated for their feasibility.

Items 4 and 5: Secondary recreational and environmental benefits associated with the possible alternatives formulated for flood damage reduction would be addressed.

Items 6 and 7: The use of borrow from the west lake area would be considered during the Cedar Falls Section 205 Feasibility Phase study. We foresee no other impacts to the lakes area from the Cedar Falls project.

Item 8: Any impacts to the Cedar Valley lakes project from future projects would be evaluated at that time as part of the study process.

Item 9: Analyses of developmental areas within the Cedar Valley Lakes area, as they pertain to flood damage reduction, would be investigated.

Item 10: During the reconnaissance study, channel modifications would be investigated as a structural alternative to reduce flood damages. River channel borrow areas for potential flood control projects will be investigated, in addition to potential flood control and other associated (such as recreational) benefits resulting from Iowa Department of Transportation river channel borrow for highway construction activities in the area.

Item 11: Restoration, enhancement, or development of wetlands may be be considered as a mitigation item to offset adverse impacts identified during more detailed study phases.

Item 12: Initial hydrologic analyses will be performed during the reconnaissance study to assist in formulating preliminary alternatives to reduce flood damages.

In your letter, you also listed three additional items for review. The types of detailed investigations suggested by these three items would be performed during a feasibility level of study. Any feasible projects recommended in the reconnaissance report for additional Federal consideration may progress to the feasibility level of study.

A meeting may be warranted in the future between Colonel Brown, Congressman Nagle, and the Cedar Valley Lakes Board. I would like to discuss this possibility further during our continued coordination efforts on the reconnaissance study. A meeting of this nature would be appropriate near the end of the reconnaissance study when we have a better idea of the problems, solutions, and future role of the Federal Government in the area.

Should you have any questions concerning our comments, please call Ms. Karen Bahus at 309/788-6361, Ext. 216, or Mr. Charles Farnham at Ext. 448. We look forward to continuing our productive partnership on the upcoming reconnaissance study.

Sincerely,

Patrick Burke for

Dudley M. Hanson, P.E.
Chief, Planning Division

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF

August 1, 1990

Planning Division

NOTICE OF INITIATION AND OPEN HOUSE

Reconnaissance Study
for
Cedar River and Tributaries
Black Hawk County, Iowa

The Rock Island District of the U.S. Army Corps of Engineers (Corps) has initiated a Reconnaissance Study to investigate the current water resource problems in Black Hawk County, Iowa. The authorizing resolution was adopted by the House Committee on Public Works and Transportation, House Report Docket 2301, dated September 8, 1988. The resolution requests review of previous reports in the interests of flood control, water and recreation development, and allied purposes, with particular emphasis on Black Hawk County.

The Cedar River runs diagonally across Black Hawk County from northwest to southeast. Major streams in the county include the Wapsipinicon River, Black Hawk Creek, Beaver Creek, Elk Run Creek, Crane Creek, and Wolf Creek. The Corps of Engineers Reconnaissance Study will examine the water resource problems in Black Hawk County to determine if there are economically, environmentally, socially, and technically acceptable solutions that warrant further Federal consideration. The study duration will be 12 months.

As part of the public involvement and information gathering process, the Corps of Engineers will sponsor an open house on August 29, 1990. The open house will be held at the Iowa Northland Regional Council of Governments' Board Room, 185 West 4th Street, Waterloo, Iowa. You are encouraged to attend at any time during 1 p.m. to 4 p.m. or 6 p.m. to 8 p.m. to discuss on a one-to-one basis with a Corps representative information you may have on water resource problems and needs in Black Hawk County.

If you have any questions, please call our study manager, Ms. Karen L. Bahus, Flood Control and Special Studies Branch, Planning Division, at 309/788-6361, Ext. 6216, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

John R. Brown
Colonel, U.S. Army
District Engineer

City of Elk Run Heights
IOWA 50707
A place to Grow

City of Elk Run Heights

PHONE (319) 232-0020 • 5042 LAFAYETTE ROAD
ELK RUN HEIGHTS, IOWA 50707

August 30, 1990

Col. John Brown
U.S. Army Corp.
Clock Tower Building
Rock Island, IL 61204-2004

Sir:

I am writing to request your assistance in a situation that is causing my city problems. We have an area in a residential section of our city that floods whenever we receive locally heavy rains. I realize you normally work with navigable streams and waterways, but one of our council men (Sandlin Gillen) had a conversation with Mr. Terry Steiger. Mr. Steiger recommended we write you and request a visit to our city to look at our problem. I understand he stated this was not the normal type of problem you work on but that possibly someone could come and offer a recommendation to alleviate our problem based on their expertise.

Any assistance you may be able to provide will be greatly appreciated.

Sincerely,

Wm R Henninger, II

Wm. R. Henninger, II
Mayor, City of Elk Run Heights

cc: Honorable Charles E. Grassley
Gary Vick Elk Run Hts Chairman Flood Committee

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF:

September 12, 1990

Planning Division (1105-2-10b)

Honorable William R. Henniger, II
Mayor, City of Elk Run Heights
5042 Lafayette Road
Elk Run Heights, Iowa 50707

Dear Mayor Henniger:

I am responding to your August 30, 1990, letter requesting assistance concerning flooding in the city of Elk Run Heights.

The Rock Island District of the U.S. Army Corps of Engineers has recently initiated a reconnaissance study investigating flooding problems throughout Black Hawk County, Iowa. We are aware that your city has been experiencing flooding problems, and we plan to include Elk Run Heights in the reconnaissance study.

Our study team will be visiting potential study sites in Black Hawk County within the next few weeks. We will contact you prior to this visit to arrange a meeting to discuss the city's flooding problems. At that time, we also will provide short-term recommendations, if any, that the city may undertake to help alleviate flooding problems.

Should you have any questions, please call the study manager Ms. Karen Bahus, Flood Control and Special Studies Branch, telephone 309/788-6361, Ext. 6216.

Sincerely,

ORIGINAL SIGNED BY
PATRICK T. BURKE, P.E.

Dudley M. Hanson, P.E.
Chief, Planning Division

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF:

September 11, 1990

Planning Division

SEE DISTRIBUTION LIST

The Rock Island District of the U.S. Army Corps of Engineers has initiated a reconnaissance study to investigate the water resources problems occurring within Black Hawk County, Iowa.

The primary purpose of the study is flood damage reduction. The study will examine identified problems to determine if there are economically, environmentally, technically, and socially acceptable solutions that warrant further Federal consideration. The study duration will be 12 months.

We wish to assure that the water resource problems of all communities within Black Hawk County, as well as surrounding communities, are included in the study. A comment sheet is enclosed for your use. By filling out and returning the comment sheet, problems in your community will be addressed in the reconnaissance study. The comment sheet is pre-stamped for your convenience.

Should you have any questions, please call Ms. Karen Bahus of our Flood Control and Special Studies Branch at 309/788-6361, Ext. 6216, or Mr. Charles Farnham at Ext. 6448.

Sincerely,

Dudley M. Hanson, P.E.
Chief, Planning Division

Enclosure

DISTRIBUTION LIST FOR
BLACK HAWK COUNTY, IOWA
RECONNAISSANCE STUDY

MAYOR JACK COOPER, 412 THIRD STREET
BOX 647, ALLISON IA 50602

MAYOR DENNIS MATURA, CITY HALL
APLINGTON IA 50604

MAYOR RICHARD MINNIER, 102 MAIN STREET
AREDALE IA 50605

MAYOR RICHARD A ROEPKE, CITY HALL
AURORA IA 50607

MAYOR REYNOLD HENTGES, CITY HALL
ALTA VISTA IA 50603

MAYOR HAROLD SKRAMOVSKY, BOX 98
BEAMAN IA 50609

MAYOR ROBERT BEARBOWER, CITY HALL
BRANDON IA 52210

MAYOR ROBERT RESSLER, 716 WEST STREET
BRISTOW IA 50611

MAYOR KENNETH SMITH, 115 W SUPERIOR
CLARKSVILLE IA 50619

MAYOR BILL GEARHART, 202 MAIN - BOX 429
CONRAD IA 50621

MAYOR EUGENE LEONHART, MAYOR OF DENVER
PO BOX 897, WATERLOO IA 50704

MAYOR & CITY COUNCIL, DEWAR IA 50623

MAYOR DONALD E KNUDSEN, CITY HALL
DIKE IA 50624

MAYOR MICHAEL SCHARES, CITY HALL
DUNKERTON IA 50626

MAYOR HALDEN COLLINS, CITY HALL
DUMONT IA 50625

MAYOR WILLIAM HENNINGER, CITY HALL
ELK RUN HEIGHTS IA 50707

MAYOR MAURICE E WELSH, CITY HALL
FAIRBANK IA 50629

MAYOR & CITY COUNCIL, FINCHFORD IA 50613

MAYOR RAYMOND NIEWOEHNER, CITY HALL
FREDERICKSBURG IA 50630

MAYOR TAMARA ROSOL, CITY HALL
FREDERIKA IA 50631

MAYOR LARRY VAN DEEST, CITY HALL
GRUNDY CENTER IA 50638

MAYOR JACK MAYER, CITY HALL
GILBERTVILLE IA 50634

MAYOR ARTHUR WEISS, CITY HALL
GREENE IA 50636

MAYOR VIRGINIA STEIL, PO BOX 371
HAZELTON IA 50641

MAYOR JASPER WESTERMAN, CITY HALL
HOLLAND IA 50642

MAYOR DANIEL BROBST, 525 JEFFERSON
HUDSON IA 50643

MAYOR FRANK R BRIMMER, 331 1ST STREET
INDEPENDENCE IA 50644

MAYOR JAMES ASHLEY, ROUTE 2
IONIA IA 50645

MAYOR JAMES MACKAY, PO BOX 326
JANESVILLE IA 50647

MAYOR MARK COLLETT, 855 CHURCH ST
JESUP IA 50648

MAYOR ALFRED HOTCHKISS, PO BOX 172
LAMONT IA 50650

MAYOR ROGER CROELL, CITY HALL
LAWLER IA 52154

MAYOR JERRY SHINN, BOX 33
MORRISON IA 50657

MAYOR WAYNE F PETERSON, CITY HALL
NASHUA IA 50658

MAYOR A DONALD JOHNSON, 112 E SPRING ST
NEW HAMPTON IA 50659

MAYOR VINCENT TENGE, CITY HALL
NORTH WASHINGTON IA 50661

MAYOR HARLEY D HARTMAN, 505 COATES
PARKERSBURG IA 50665

MAYOR EMMET KIEHN, CITY HALL
PLAINFIELD IA 50666

MAYOR MORRIS E KING, CITY HALL
QUASQUETON IA 52326

MAYOR EUGENE BLASER, 155 LANDMARK
RAYMOND IA 50667

MAYOR LON LARSEN, 706 PARK
REINBECK IA 50669

MAYOR DONALD KOSCHMEDER, 128 MAIN ST - BOX 70
READLYN IA 50668

MAYOR KENNETH NIELSON, BOX 68
ROWLEY IA 52329

MAYOR BEVERLY EVERSON, 421 CHERRY STREET
SHELL ROCK IA 50670

MAYOR DUANE FOX, BOX 68
STANLEY IA 50671

MAYOR BUD VENEGA, CITY HALL
STOUT IA 50673

MAYOR FORREST CANNELL, CITY HALL
SUMNER IA 50674

MAYOR EUGENE BUENGER, PO BOX 87
TRIPOLI IA 50676

MAYOR KENNETH CORDES, CITY HALL
WELLSBURG IA 50680

MAYOR NOAH WHITE, BOX 96
WINTHROP IA 50682

US Army Corps of Engineers
Rock Island District

Date _____

COMMENT SHEET
FOR
CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA
RECONNAISSANCE STUDY

As residents of Black Hawk County, you have a special knowledge about the study area. Your concerns, questions, and opinions are of vital importance to the success of this study as we identify issues and problems which need to be addressed. For our planning process to be effective, it is important that you identify any water resources problems and concerns for Black Hawk County, Cedar River, or its tributaries.

Please take the time to answer these questions and to provide us with any additional information you feel will help us with our study.

1. Please describe the problem you are concerned about. _____

_____

_____

2. Describe the specific location of the problem. _____

_____

3. How does this problem affect you? _____

_____

_____

4. How many others are affected? _____

5. How long has the problem been going on? _____

6. If it is a flood problem, how much damage has been caused? _____

_____

_____

7. What would be the benefits from solving the problem? _____

_____

_____

PLEASE EXPAND YOUR ANSWERS TO THE QUESTIONS ABOVE, OR LIST ANY WATER RESOURCES CONCERNS, NEEDS, OR IDEAS YOU HAVE FOR BLACK HAWK COUNTY OR CEDAR RIVER AND ITS TRIBUTARIES. PLEASE BE AS SPECIFIC AS POSSIBLE.

_____

_____

_____

NAME (Optional) _____

ADDRESS _____

REPRESENTING __ Self __ Other (Specify) _____

DO YOU WISH TO BE PLACED ON OUR STUDY MAILING LIST? __ Yes __ No

If you know of anyone who may be interested in this study, but was unable to attend our open house, please take a copy of this form for them to complete.

- -

NOTE

Please give your completed sheet to a Corps of Engineers representative before you leave. Or, if you prefer, you may take it with you to complete, and return it by mail no later than September 15, 1990. Please fold and seal this postage-paid, self-addressed form and drop it in a mail box. Thank you.

PRIVACY ACT STATEMENT

In accordance with the Privacy Act of 1974 (Authority: Paragraph 11, ER 1105-2-502), routine uses of the information obtained from this form include compiling official mailing lists for future informational publications and recording additional views and public participation in studies. Disclosure of information is voluntary.

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DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT. CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND. ILLINOIS 61204-2004

REPLY TO ATTENTION OF:

November 19, 1990

Planning Division (1105-2-10b)

Honorable William R. Henninger, II
Mayor
City of Elk Run Heights
5042 Lafayette Road
Elk Run Heights, Iowa 50707

Dear Mayor Henninger:

I am writing to discuss the storm water flooding problems being experienced in the Shirley Subdivision, as observed during a site visit on October 17, 1990, with staff from our Planning and Engineering Divisions. We also have reviewed the report prepared by Jensen, Cary, & Shoff Consulting Engineers, Inc., dated October 1986.

Federal criteria for flood control assistance require 800 cubic feet per second or more for a 100-year peak discharge at the prospective project site. This particular storm water flooding problem does not meet that criteria. However, I would like to provide technical information that may assist you in alleviating the flooding problem.

Any plans to divert flow to Elk Run Creek would not be advisable. The natural slope of the land directs flow away from the creek, and any plan to redirect flow toward the creek would require a significantly large and deep channel. Also, redirecting this flow to Elk Run Creek may cause hydrologic impacts on the creek's drainage basin.

It appears that incorporating drainage features through the Shirley Subdivision, such as an open channel, would require relocating several homes and may devalue other homes. A safety hazard also may be created with the use of an open channel. A buried reinforced concrete box culvert would probably be a very costly alternative.

Plans having the least impact on existing residents involve the use of a detention basin. A properly designed detention basin and outlet would reduce the flood peak. however, the slow release of water would prolong the discharge of water as compared to existing conditions. In addition, if the capacity of the detention basin were exceeded, a flood flow would still be released, although of lower magnitude. Outlets could be designed to consider all

flood events from a 2-year storm to the 100-year storm. An outlet designed only for the rarest storms would be oversized and would allow more frequent but smaller storm flows to pass readily into the subdivision. Also, provisions should be made for safe release of water once the capacity of the detention basin is reached.

It appears that a hydrologic analysis would be needed to determine if the land between Lafayette and Dubuque Roads would provide adequate storage capacity. However, use of this area for a detention basin would limit future uses of this land. Consideration of a detention basin north of the railroad would require compensation to the landowners for periodic inundation of their cropland. It may be most economical to place an impervious berm along the railroad embankment and reduce the 60-inch RCP culvert opening. If the railroad opposes this use of their embankment, a separate embankment running parallel to the railroad embankment may be considered.

Should you have any questions concerning our comments or need additional information, please call Ms. Karen Bahus of my Flood Control and Special Studies Branch at 309/788-6361, Ext. 6216, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

ORIGINAL SIGNED BY
PATRICK T. BURKE, P.E.

Dudley M. Hanson, P.E.
Chief, Planning Division

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF:

December 21, 1990

Planning Division

SEE DISTRIBUTION LIST

The Rock Island District of the U.S. Army Corps of Engineers is conducting a reconnaissance study to determine if there are possible solutions to address identified flood damage reduction and other water resource problems in Black Hawk County, Iowa.

The Black Hawk County area has been studied in the past for flood control (enclosure 1); however, this study addresses flood control at five locations: Hudson, Dunkerton, Cedar City and North Cedar, Evansdale and Elk Run Heights, and the Cedar River near San Succi Island in Waterloo. Enclosure 2 outlines the components of each study area.

A broad range of structural and nonstructural measures will be considered and examined in the reconnaissance study as the basis for formulating alternative plans. Structural solutions involve such measures as levees, floodwalls, and channel improvement reservoirs. Nonstructural solutions include floodplain zoning, floodproofing, floodplain evacuation, and flood-warning systems.

Please provide any initial comments you may have for this project, with particular regard to any environmental aspects or concerns. Please respond within 30 days of the date of this letter. If you should want additional information, please call Mr. Joseph Jordan of our Environmental Analysis Branch at 309/788-6361, Ext. 6697, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

ORIGINAL SIGNED BY
PATRICK T. BURKE, P.E.

Dudley M. Hanson, P.E.
Chief, Planning Division

Enclosures

DISTRIBUTION LIST

Mr. Richard Nelson
U.S. Fish and Wildlife Service
1830 Second Avenue
Rock Island, Illinois 61201 (w/all enclosures)

Mr. Larry Wilson
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, Iowa 50319 (w/all enclosures)

Mr. Morris Kay
U.S. Environmental Protection Agency
726 Minnesota Avenue
Kansas City, Kansas 66101 (w/all enclosures)

Director
Black Hawk County Conservation Board
Black Hawk County Court House
Waterloo,Iowa 50702

Black Hawk County Board of Supervisors
Black Hawk County Court House
Waterloo,Iowa 50702

Director
Iowa Department of Transportation
800 Lincoln Way
Ames, Iowa 50010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

January 8, 1991

Colonel John R. Brown, USA
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Brown:

This is in response to your request for comments concerning reconnaissance studies for the Black Hawk County, Iowa area.

Upon review of the supporting information provided, we note that certain communities requesting flood protection contain development that is currently located within the 100-year flood plain (Dunkerton) while others propose such development (Evansdale). With respect to communities such as Evansdale and any other locations that might result in induced flood plain development, we request that you continue the reconnaissance studies in full recognition of Executive Order 11988 on flood plain management which, in general, discourages unnecessary development within the flood plain. It is our position that proposed projects such as Evansdale should be reviewed very carefully to be certain there are no alternatives to flood plain development.

Thank you for the opportunity to comment.

Sincerely,

Lawrence M. Cavin
Chief, Environmental Review
and Coordination Section

cc: Charles Vondracek, Mayor, City of Evansdale, Iowa

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF:

January 9, 1991

Planning Division (1105-2-10b)

Mr. James Jacobsen
Bureau of Historic Preservation
ATTN: Review and Compliance Program
State Historical Society of Iowa
Capitol Complex
Des Moines, Iowa 50319

Dear Mr. Jacobsen:

The Rock Island District of the U.S. Army Corps of Engineers (Corps) is forwarding a report entitled Preliminary Cultural Resource Investigation for the Reconnaissance Study for Cedar River and Tributaries, Black Hawk County, Iowa.

The opinion of the Corps is that the four areas discussed in this report -- and any other areas within the current Reconnaissance Study for Cedar River and Tributaries, Black Hawk County, Iowa, that may have specific proposals recommended as viable solutions to reducing flood damages -- will require intensive archaeological, geomorphological, and architectural investigation focusing upon areas of potential project impacts.

Please review this report and provide any comments you may have within 30 days.

If you have any questions regarding this matter, please call Mr. Ron Pulcher of our Environmental Analysis Branch at 309/788-6361, Ext. 6384, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

ORIGINAL SIGNED BY
PATRICK T. BURKE, P.E.

Dudley M. Hanson, P.E.
Chief, Planning Division

Enclosure

United States Department of the Interior

Fish and Wildlife Service
Rock Island Field Office (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

COM: 309/793-5800
FTS: 782-5800

TAKE PRIDE IN AMERICA

In Reply Refer to:

January 23, 1991

Colonel John R. Brown
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Brown:

This constitutes our planning aid letter for the Black Hawk County, Iowa and Vicinity, Cedar River and Tributaries Reconnaissance Study. It has been prepared under the authority of, and in accordance with, provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); and the Endangered Species Act of 1973, as amended.

DESCRIPTION OF THE PROJECT

The reconnaissance study is a preliminary investigation of flood damage problems and possible solutions. The study's primary objective is to determine if there are possible solutions that are economically justified, feasible from an engineering standpoint, and are environmentally and socially acceptable. Numerous sites in Black Hawk County were evaluated for historical and potential flooding problems, and several localities were identified which warranted further investigation as part of the reconnaissance study. These sites are located in the towns of Hudson, Dunkerton, Cedar City and North Cedar, and Evansdale and Elk Run Heights.

A number of measures will be considered for reducing flood damage. Structural solutions could include levees, floodwalls, and channel alterations. Non-structural measures include floodplain zoning, floodproofing, floodplain evacuation and floodwarning systems.

DESCRIPTION OF THE STUDY AREAS

Hudson, Iowa

Hudson is located adjacent to the floodplain of Black Hawk Creek, and several buildings and a golf course experience flooding. (Fig. 1).

Black Hawk Creek is a meandering stream up to 25 feet wide at this location. A variety of aquatic habitats are present. Instream habitat is good, although sampling by the Iowa DNR immediately upstream from the site revealed that fish biomass was dominated by carp. A diversity of fish species, primarily members of the Catostomidae, Cyprinidae and Ictaluridae families, are present. Some use of Black Hawk Creek by spawning catfish from the Cedar River would be expected.

The floodplain is 1/8 to 3/8 miles across and is classified as palustrine forested wetland on channeled alluvial soils. This bottomland forest is dominated by silver maple, American elm and green ash, primarily less than 15 inches diameter at breast height (dbh). A fairly dense understory is present. Scattered meander scars are present throughout this area. This unbroken forest corridor constitutes the only significant wildlife habitat in this part of Black Hawk County and for this reason a portion of the study area is protected as part of the Black Hawk Creek Green Belt. This type of habitat is used by deer, beaver, small game, raptors, wood ducks, great blue herons and a variety of non-game birds.

The alluvial bench adjacent to the forested wetlands is slightly higher in elevation, although still prone to flooding. This land is used primarily as pasture, but large bur oaks and other trees are still present. This has value primarily for deer and species such as squirrels and red-headed woodpeckers associated with the oaks.

Dunkerton, Iowa

The town of Dunkerton is located in the 100-year floodplain of Crane Creek (Fig. 2), with the town being 100-200 feet from the creek in some locations. It experienced flooding in 1968 and 1990.

Crane Creek is approximately 25-35 feet in width, and is up to 3 feet in depth. Aquatic habitat diversity is high, and would support good numbers of carp, catostomids and catfish. Due the site's proximity to the Wapsipinicon River, Crane Creek at this location would have high value as nursery habitat for juvenile game fish such as channel catfish, smallmouth bass and northern pike. Valves of the paper floater (Anodonta imbecillus) were also found.

The floodplain, which is less than 1/4 mile in width, is palustrine forested wetland, dominated by American elm, green ash, silver maple and box elder. Scattered red oak, shagbark hickory and black cherry are present on small ridges in the floodplain. The understory is dense, and is dominated by gooseberry, blackberry and honeysuckle. Old channel habitat with standing water is present both east of the highway and west of the railroad tracks. This forested wetland habitat provides good habitat for deer, wood ducks, raccoons and a variety of non-game species. A beaver dam was also observed under the railroad bridge.

A city park, which has numerous large trees and a small pond is located north of Crane Creek between the highway and the railroad track. Wildlife values for the park are fairly low due to its developed nature.

Evansdale/Elk Run Heights

A portion of undeveloped land in the City of Evansdale is located in the floodplain of Elk Run Creek (Fig. 3). Elk Run Heights receives little or no flooding from the creek, which is a relatively small, meandered stream with a channel 10-15 feet in width. Instream cover is excellent with abundant fallen trees and pools. The bottom substrate is primarily sand. Large numbers of minnows were observed, and the stream would provide nursery habitat for species such as smallmouth bass and channel catfish, which are found in the Cedar River immediately downstream.

Palustrine forested wetland on channeled loamy alluvial soil is present along the creek. Tree composition is green ash, American elm, silver maple with scattered hackberry and oak. A well developed understory of gooseberry, blackberry, and honeysuckle is also present. Most of the trees are pole-sized with a few larger individuals up to 40 inches dbh. Oak dominates the adjacent hillsides. These habitats act as a corridor for wildlife movement between the Cedar River and rural areas north of Evansdale. They also provide habitat for a variety of wildlife species such as deer, squirrels and songbirds. Beaver sign was abundant along the creek. An area to the east of the creek that is slightly higher in elevation, but still within the floodplain, is presently in agricultural fields or part of a Black Hawk County-managed park. These areas have little value to wildlife. Bunger Park, a small city-managed park, is also located on the west bank of Elk Run Creek.

Cedar City/North Cedar

An extensive tract of relatively undeveloped Cedar River floodplain lies directly to the south of North Cedar (Fig. 4).

The floodplain is forested palustrine wetland with numerous oxbows and old channels which contain water on a semi-permanent basis. A variety of tree species, including honey locust, swamp white oak, box elder, green ash, cottonwood, hackberry, silver maple and American elm, mostly 30-40 years old, are present. A University of Northern Iowa Nature Preserve and Island Park, which is partly developed, are located in the floodplain west of Highway 218. East of Highway 218, some natural forested wetland and oxbows remain, but a number of lakes have been excavated by a sand mining operation. Other areas have been filled and are used for disposing of concrete and trees. All of this forested wetland has high wildlife values, but it is particularly valuable for species such as wood ducks, great blue herons, and amphibians, due to the large amount of shallow water habitat available. Wildlife species such as deer, raccoons, raptors and songbirds are abundant.

The Cedar River provides the primary aquatic habitat in this area. It has been significantly altered at this site by several low head dams and construction activities. However, surveys indicate a good channel catfish fishery with populations of smallmouth bass, walleye and northern pike also present.

Sans Souci Island

Sans Souci Island is a large island (Fig. 5) of palustrine forested wetland, approximately 160 acres in size, located in the Cedar River. It is densely forested with mature bottomland hardwoods. Tree species consists of cottonwoods, silver maple, green ash and box elder. Only a very narrow riparian strip is present along the mainland banks. Sans Souci Island has significant wildlife values due to its size and isolation, and provides habitat for a wide variety of wildlife species, including migrant bald eagles and other raptors, great blue herons, wood ducks, several woodpecker species and white-tailed deer.

The aquatic habitat present consists of the two channels of the Cedar River. The south channel was partially closed several years ago with a notched closing dam. This dam was constructed in an effort to divert flow into the north channel to scour out sediment deposits. The dam was notched to maintain water flow through the south channel. Flow in the north channel is relatively slow moving and the bottom substrates consists of fine sediments. Flow in the south channel is faster moving and a rocky substrate is present. The north channel supports a typical Cedar River fishery dominated by channel catfish, with a few smallmouth bass, northern pike and walleye. The south channel, however, because of its rocky substrate, has a significant population of smallmouth bass. Smallmouth fisheries such as this are rare on the Cedar River.

Endangered Species

The peregrine falcon (Falco peregrinus) is the only federally endangered species listed for Black Hawk County. The listing is based on historical breeding data. However, no suitable habitat is found in the area studied. We therefore anticipate no adverse impact on this species. Migratory bald eagles (Haliaeetus leucocephalus) are also found along the Cedar River on occasion. They use the study area on an intermittent basis and are dependant on the presence of perching trees along the Cedar River. Therefore, if large trees along the river are not disturbed, which does not appear likely, we anticipate no impact on bald eagles. This precludes the need for further action on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Should this project be modified, or new information indicates that an endangered species may be affected, consultation should be initiated.

FUTURE WITHOUT PROJECT

Habitats for fish and wildlife in the project are not likely to change significantly if the project is not constructed. Any negative changes that do occur would probably result from development of recreational facilities, or use of floodplain sites for agricultural uses.

FUTURE WITH PROJECT

The impact from the project on fish and wildlife is highly dependant on the measure used for flood reduction. Non-structural solutions will have no impact on fish and wildlife, and measures such as floodplain zoning and floodplain evacuation could be beneficial if development in the floodplain is reduced. Structural measures could result in the loss of forested wetlands, although the amount of loss would be dependant on their location. Channel improvements would have severe impacts on aquatic habitats, particularly on creeks and streams.

Mitigation

In accordance with our Mitigation Policy, we have evaluated the habitat categories in the study area and recommend the following mitigation goals:

Forested wetlands and backwaters, Streams with unaltered channels-These are of high value and are relatively scarce in Iowa. We recommend no net loss of in-kind habitat value. Replacement must be with the same type of habitat so that the total net loss is zero.

Modified and manmade aquatic areas, non-wetland wooded areas-These are of medium to high value and relatively abundant in

Iowa. We recommend that there be no net loss of habitat value and loss of in-kind habitat value be minimized. Losses that cannot be avoided may be compensated by replacement with in kind or other habitat types, so that net habitat loss is zero.

Recreational parks, pasture and cropland - Habitat value is of medium to low quality. We recommend that losses be avoided, minimized or eliminated depending on the significance of the potential loss.

RECOMMENDATIONS

As the specific project alternatives are not yet designed, we can only offer very general recommendations at this time. They are as follows:

1) Give highest priority to solving flooding problems through non-structural means.

2) Avoid levee alignments which pass through forested wetlands, particularly those sites with mature trees.

3) Minimize the amount of channel improvement.

4) Compensation sites for forested wetlands should be located adjacent to existing forested wetland.

5) Coordinate floodplain management and selection of compensation sites with the development of a "greenbelt" on the Cedar River.

If you have any questions, please contact John Grettenberger of my staff.

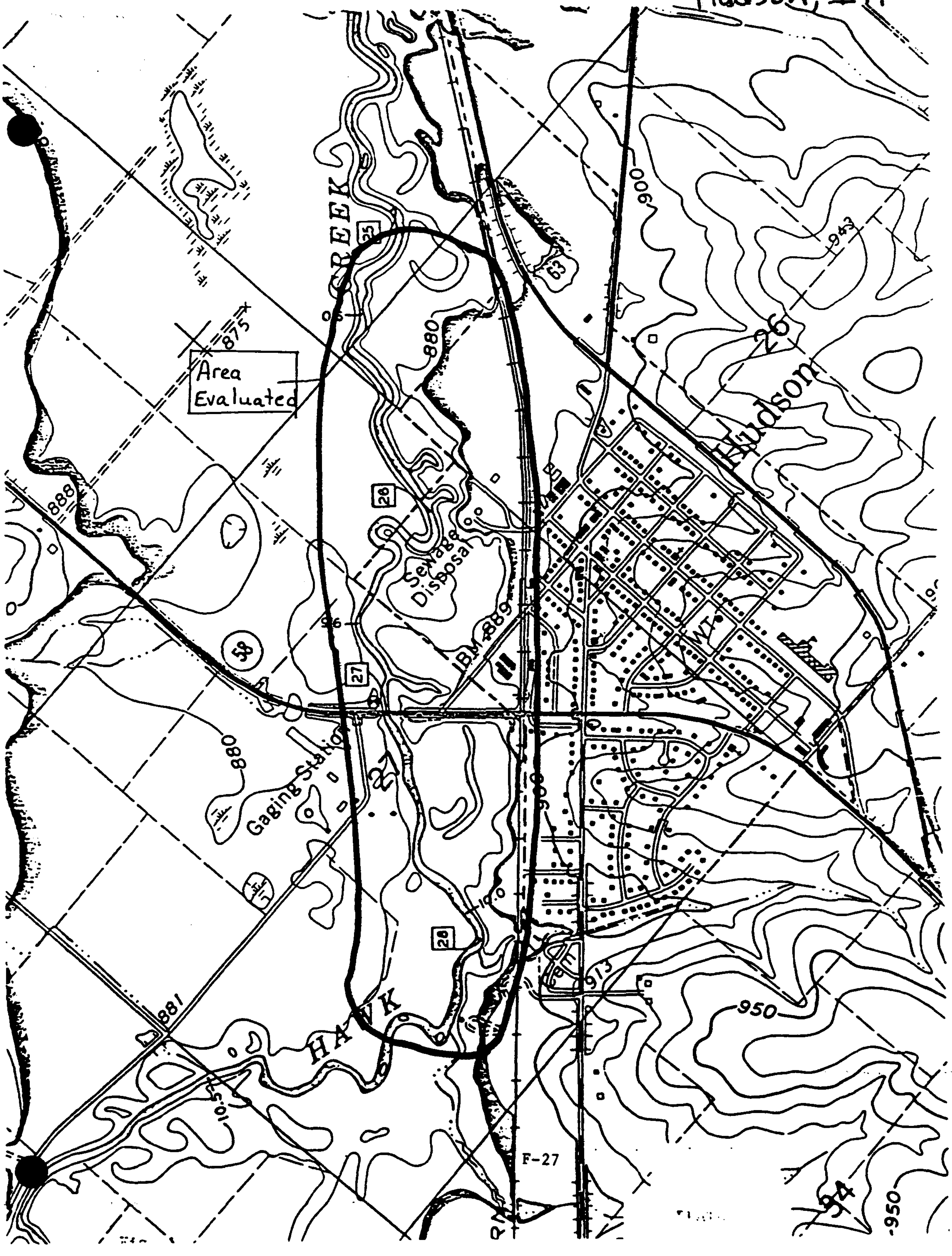
Sincerely,

Richard C. Nelson
Field Supervisor

Enclosures

cc: IADNR (Wilson, Howell, Kalishek, Roseland)
USEPA (Kansas City)

JG:sjg


Area Evaluated
CREEK
HAWK
Hudson
Sewage Disposal
Gaging Station
BM 889
875
880
888
881
900
943
950
913
58
26
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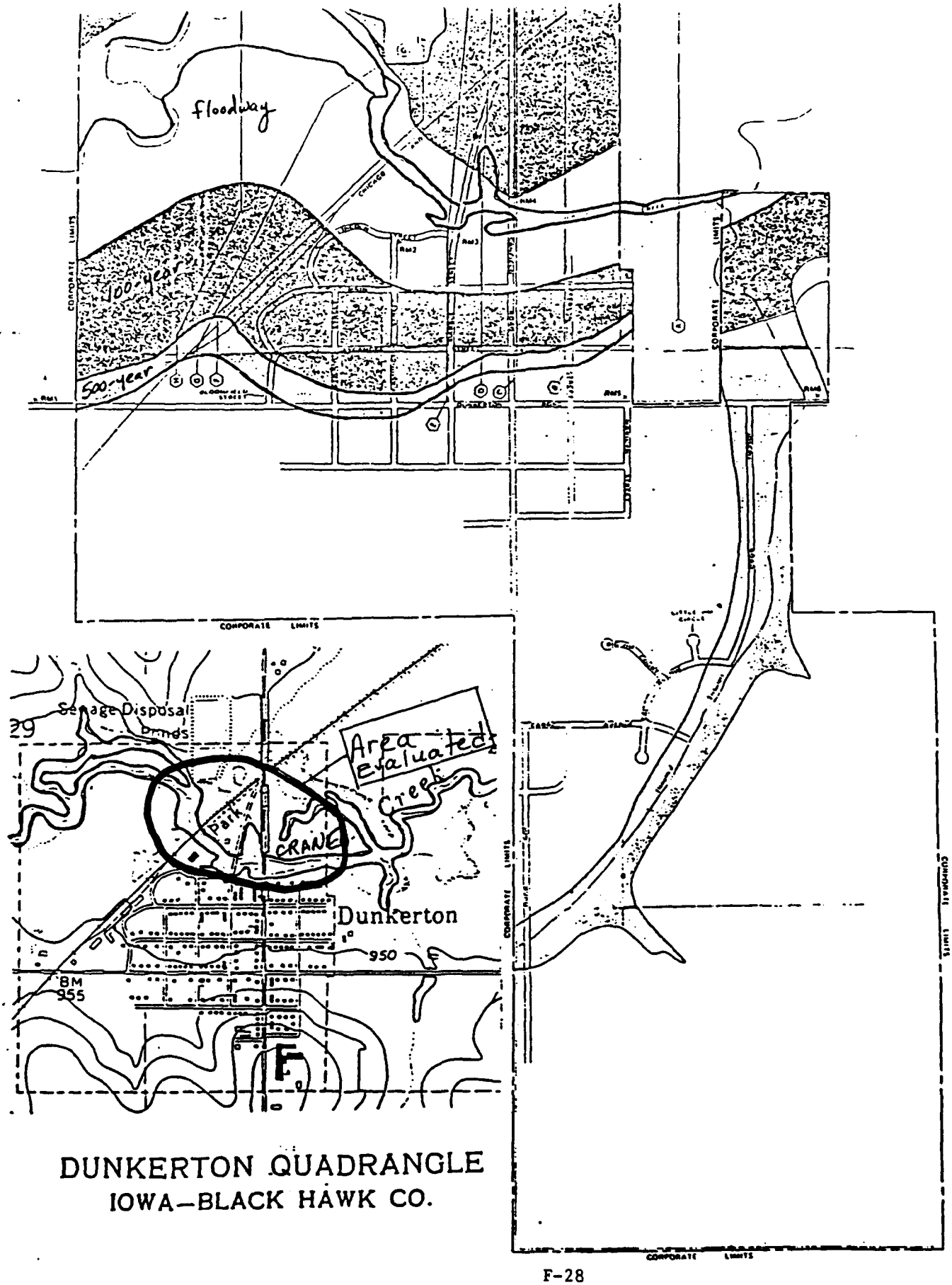
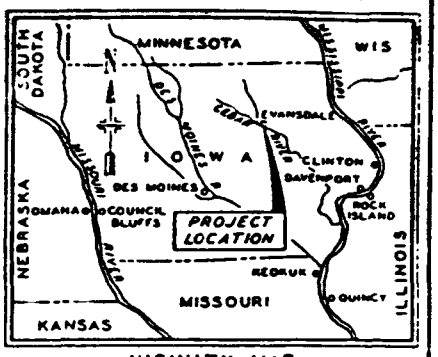
63
94
F-27



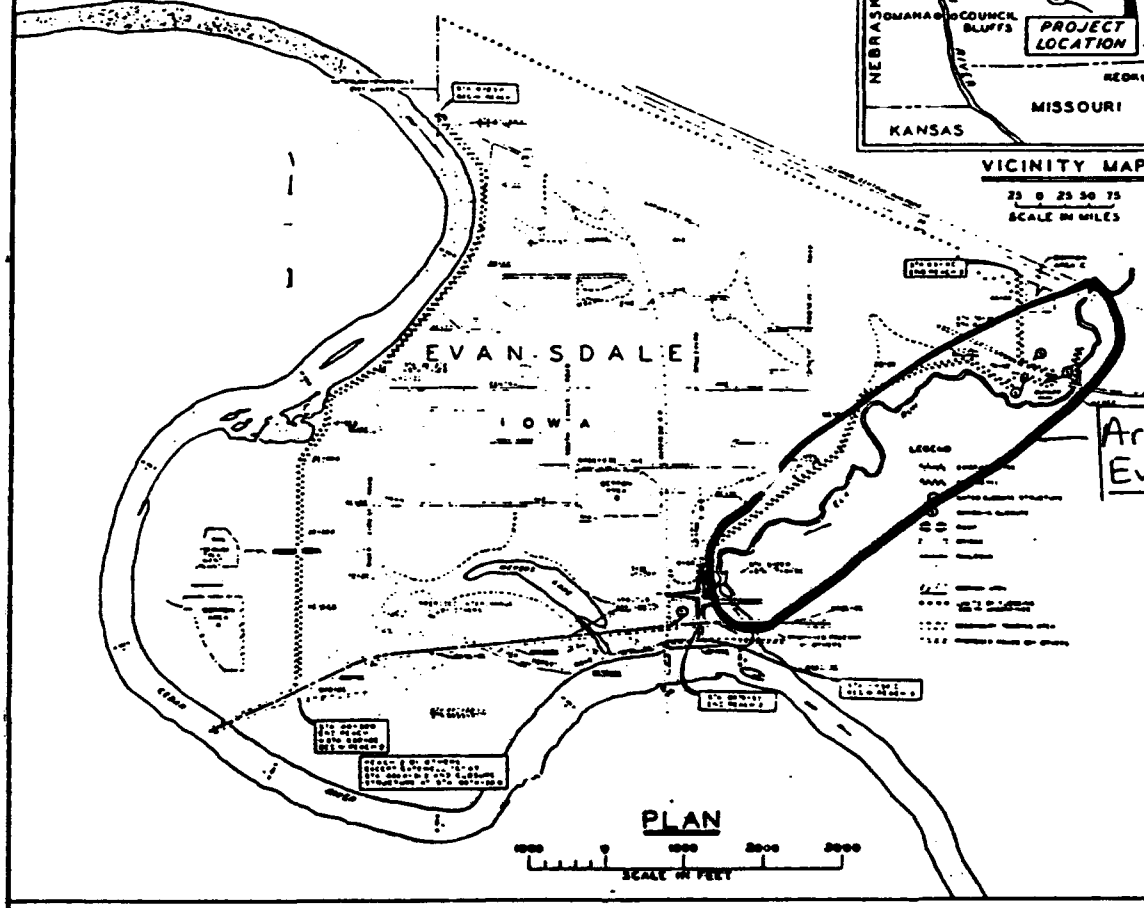
DUNKERTON QUADRANGLE
IOWA—BLACK HAWK CO.

Fig. 2



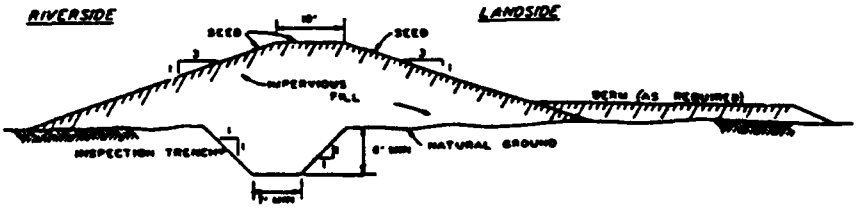
VICINITY MAP

SCALE IN MILES



PLAN

SCALE IN FEET



TYPICAL LEVEE SECTION

NO SCALE

CEDAR RIVER

EVANSDALE, IOWA

FLOOD CONTROL PROJECT

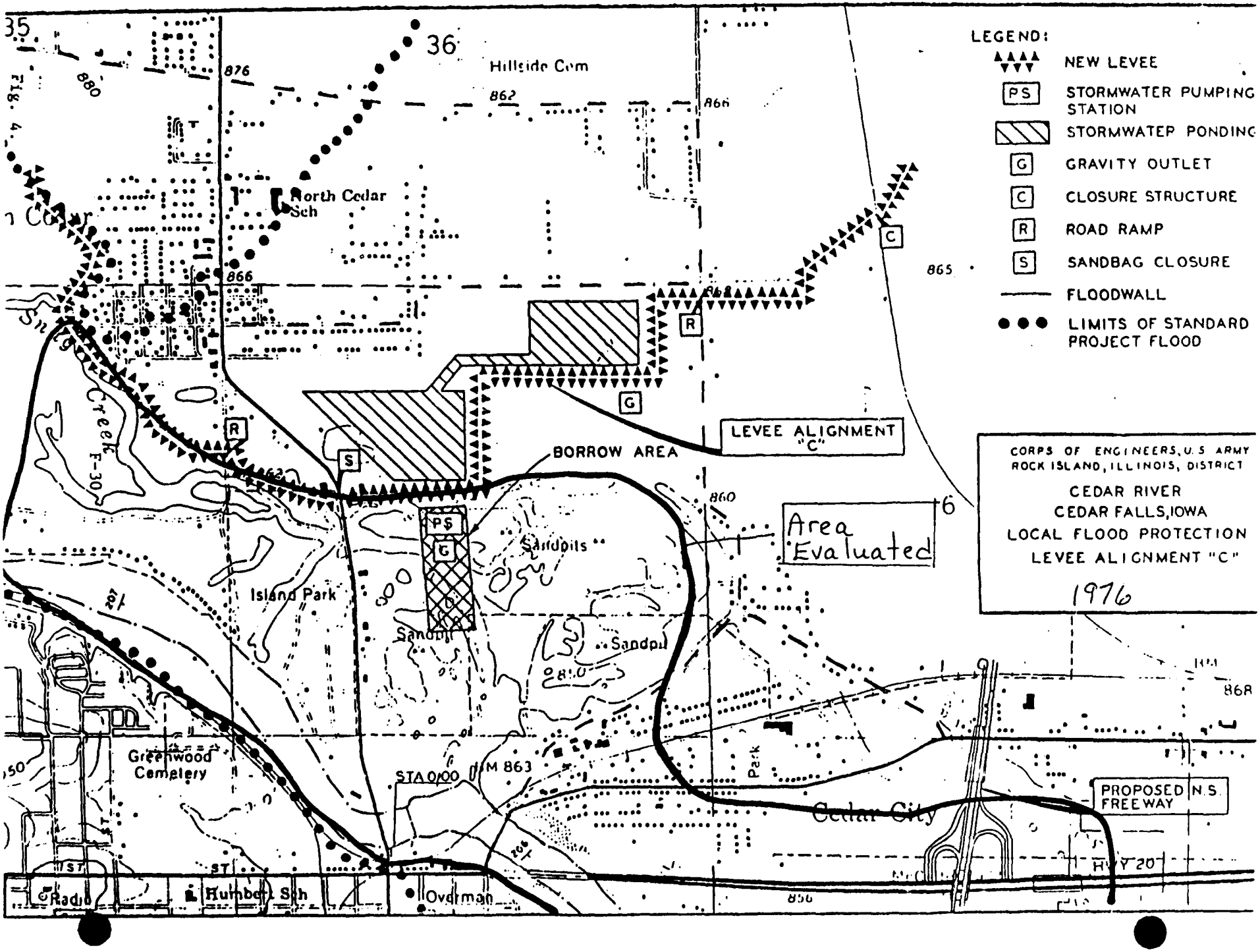
SCALE AS SHOWN

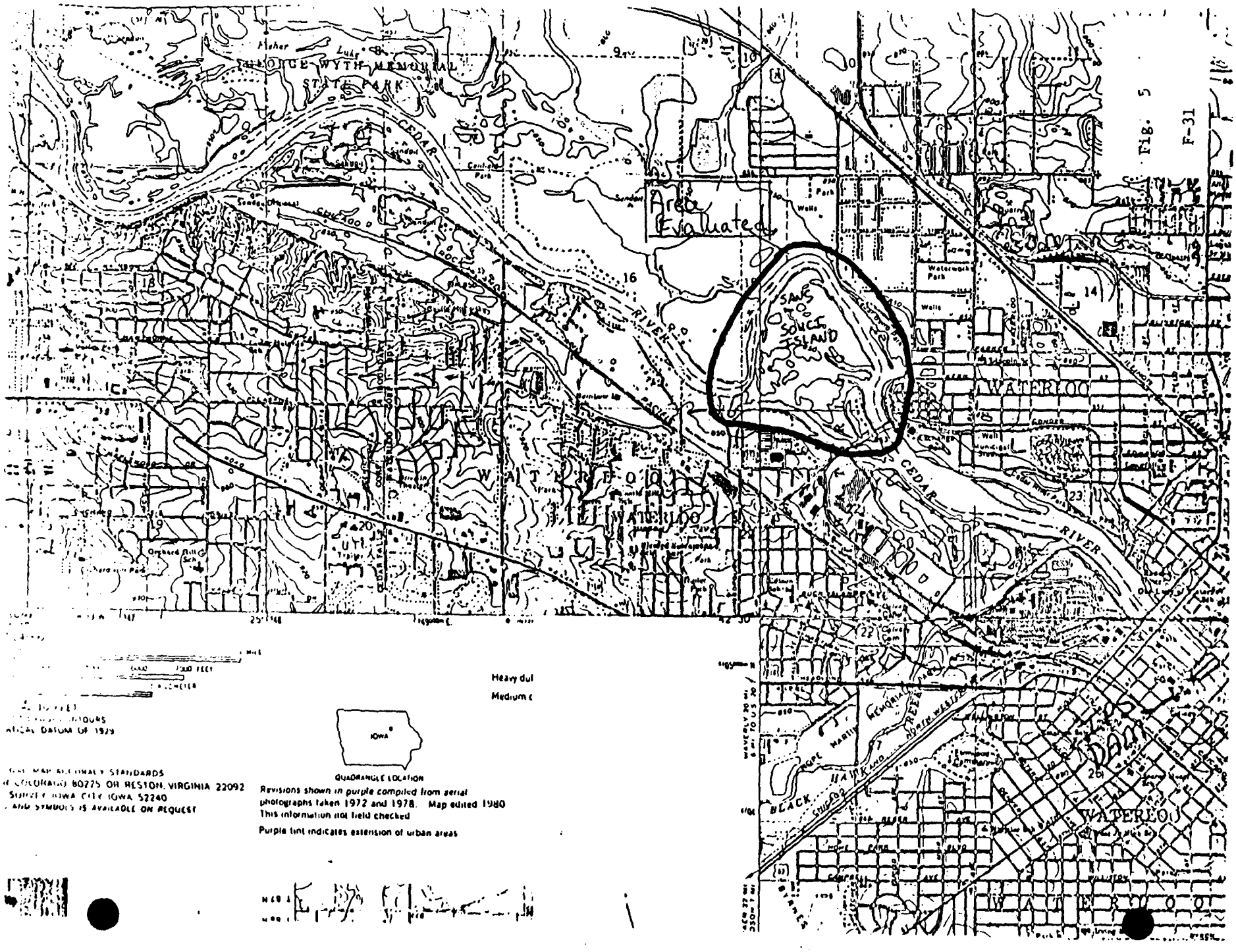
ROCK ISLAND DISTRICT

30 JUNE 1971

F-29

Fig. 3.


LEGEND:
NEW LEVEE
PS STORMWATER PUMPING STATION
STORMWATER PONDING
G GRAVITY OUTLET
C CLOSURE STRUCTURE
R ROAD RAMP
S SANDBAG CLOSURE
FLOODWALL
LIMITS OF STANDARD PROJECT FLOOD
CORPS OF ENGINEERS, U.S. ARMY
ROCK ISLAND, ILLINOIS, DISTRICT
CEDAR RIVER
CEDAR FALLS, IOWA
LOCAL FLOOD PROTECTION
LEVEE ALIGNMENT "C"
1976
Area Evaluated
LEVEE ALIGNMENT "C"
BORROW AREA
Hillside Cem
North Cedar Sch
Island Park
Sandpits
Greenwood Cemetery
STA 0+00
M 863
PROPOSED N.S. FREEWAY
Cedar City
HWY 20
Radio
Humbert Sch
Overman
Park
Creek F-30



1000 FEET

CONTOUR INTERVAL
VERTICAL DATUM OF 1929

MAP NATIONAL STANDARDS
COLORADO 80225 OR RESTON, VIRGINIA 22092
SURVEY IOWA CITY, IOWA 52240
AND SYMBOLS IS AVAILABLE ON REQUEST

Heavy dut
Medium c

IOWA

QUADRANGLE LOCATION

Revisions shown in purple compiled from aerial photographs taken 1972 and 1978. Map edited 1980
This information not field checked

Purple tint indicates extension of urban areas

State Historical Society of Iowa

The Historical Division of the Department of Cultural Affairs

February 18, 1991

In reply refer to:
R&C#: 900807039

Dudley M. Hanson, P. E.
Chief, Planning Division
Rock Island District Corps of Engineers
Clock Tower Building
P. O. Box 2004
Rock Island, IL 61204-2004

RE: COE - BLACK HAWK COUNTY - RECONNAISSANCE STUDY FOR CEDAR RIVER AND TRIBUTARIES

Dear Mr. Hanson:

We have reviewed the above-referenced report. We concur with the corps that cultural resource surveys should be conducted in any areas within the "Reconnaissance Study for Cedar River and Tributaries, Black Hawk County, Iowa," that may be proposed for specific flood control solutions.

The investigations should include intensive archeological, architectural, and geomorphological studies in areas of potential project impacts.

Should you have any questions or if the office can be of further assistance to you, please contact the Review & Compliance program at 515-281-8743.

Sincerely,

Kathy Gourley

Kathy Gourley
Archeologist, Review and Compliance Program
Bureau of Historic Preservation

/kh

☐ 402 Iowa Avenue
Iowa City, Iowa 52240
(319) 335-3916

☐ Capitol Complex
Des Moines, Iowa 50319
(515) 281-5111

☐ Montauk
Box 372
Clermont, Iowa 52135
(319) 423-7173

CEDAR VALLEY LAKES

February 28, 1991

Colonel John R. Brown
U.S. Army Corps of Engineers
Clock Tower Building
P.O. Box 2000
Rock Island, IL 61204

Dear Colonel Brown:

On behalf of the Cedar Valley Lakes Board of Directors, I am requesting your assistance in determining the proper procedure to secure corps participation through the retroactive supplemental program for completed flood protection projects.

You mentioned this program during your visit to Waterloo last June 4th following your lakes project tour with Congressman Dave Nagle.

This program may have a very timely application in the consideration of trail corridor completion between the Cedar Valley Lakes project and the Cedar Valley Nature Trail which terminates in Evansdale. Much of this trail alignment would be facilitated by the completed levee and floodwall system within Waterloo and Evansdale adjacent to the Cedar River.

Current consideration of this corps program will enable us to coordinate other state and locally funded project activities in the Cedar River corridor and to solidify planning for trail development, downtown re-development and river front enhancement.

The anticipated heavy trail usage and resultant substantial benefits to Black Hawk County has maintained the completion of this river trail corridor as a very high priority by the Cedar Valley Lakes Board and local jurisdictions.

Your assistance in addressing this matter is greatly appreciated.

Sincerely,

Rick Young

Rick Young, President
Cedar Valley Lakes
Board of Directors

RY:ja

cc: Congressman Dave Nagle
Mayor Bernie McKinley
Mr. Gerry Schnepf

531 Commercial
Suite 800
Waterloo, IA 50701
(319) 235-0311

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF:

March 13, 1991

Planning Division

Mr. Rick Young
President
Cedar Valley Lakes
Board of Directors
531 Commercial
Suite 800
Waterloo, Iowa 50701

Dear Mr. Young:

I am writing to respond to your letter of February 28, 1991, concerning the procurement of funding for the Cedar Valley Nature Trail corridor within Waterloo and Evansdale, Iowa, under Section 1135 of the Water Resources Development Act of 1986, as amended. Section 1135 authorized modifications to completed Corps of Engineers (Corps) projects for improvement of the environment. A copy of Section 1135 and the 1988 and 1990 amendments is attached for your information.

Section 1135 authorizes review of the operation of water resources projects to determine the need for modifications in their structure and/or operation for the purpose of improving the quality of the environment in the public interest. Our program and budget guidance applies the following selection criteria to proposals for the Section 1135 program:

a. Proposed work must be structural or operational modifications that will restore fish and wildlife resources at completed Corps projects.

b. Modifications must have tangible and intangible benefits (monetary and non-monetary) judged to exceed the tangible and intangible costs (economic justification).

c. Modifications must be consistent with, and they must not unacceptably impact, the authorized project purposes.

d. Economic benefits from the modifications must be associated primarily with improvements to fish and wildlife resources.

e. Modifications should have a justifiable end point to Federal involvement.

Such modifications must also be accomplished within the lands, easements, and rights-of-way of the completed project or on lands (contiguous) furnished by the sponsor without credit. No authority exists for the acquisition of additional lands, easements, or rights-of-way. The non-Federal share of total costs is currently 25 percent.

In order to submit a proposal for the Section 1135 program, we would need sufficient information to prepare budgetary documents that discuss the proposed modification; its consistency with project purposes; implementation costs; schedules; economic justification; and indication that a sponsor is willing to cost share construction of the project. Once a proposal is approved, a letter report would be prepared and a Local Cooperation Agreement would be signed by the sponsor before project construction could be initiated.

In assessing the applicability of Section 1135 authorization to the nature trail proposal along the completed Waterloo and Evansdale Local Flood Protection Projects, the major constraint appears to be that the modifications do not restore or improve fish and wildlife resources. There have been other proposals submitted with a primarily recreational benefit that were not approved by our higher authority.

I hope this information satisfies your current planning needs. If you have questions or need additional information, please call Ms. Karen Bahus of our Flood Control and Special Studies Branch, Planning Division, at 309/788-6361, Ext. 6216.

Sincerely,

ORIGINAL SIGNED BY

John R. Brown
Colonel, U.S. Army
District Engineer

Attachment

Copies Furnished:

Honorable Dave Nagle
Representative in Congress
524 Washington
Waterloo, Iowa 50701 (w/attachments)

Honorable Bernard L. McKinley
Mayor of Waterloo
City Hall
715 Mulberry Street
Waterloo, Iowa 50703 (w/attachments)

Mr. Gerald Schnepf
Executive Director
Iowa Natural Heritage Foundation
505 Fifth Avenue
Des Moines, Iowa 50309-2319 (w/attachments)

SEC. 1135. PROJECT MODIFICATIONS FOR IMPROVEMENT OF ENVIRONMENT. 33 USC 2294 note.

(a) The Secretary is authorized to review the operation of water resources projects constructed by the Secretary before the date of enactment of this Act to determine the need for modifications in the structures and operations of such projects for the purpose of improving the quality of the environment in the public interest.

(b) The Secretary is authorized to carry out a demonstration program in the two-year period beginning on the date of enactment of this Act for the purpose of making such modifications in the structures and operations of water resources projects constructed by the Secretary before the date of enactment of this Act which the Secretary determines (1) are feasible and consistent with the authorized project purposes, and (2) will improve the quality of the environment in the public interest. The non-Federal share of the cost of any modifications carried out under this section shall be 25 percent.

(c) The Secretary shall coordinate any actions taken pursuant to this section with appropriate Federal, State, and local agencies.

(d) Not later than two years after the date of enactment of this Act, the Secretary shall transmit to Congress a report on the results of the review conducted under subsection (a) and on the demonstration program conducted under subsection (b). Such report shall contain any recommendations of the Secretary concerning modification and extension of such program. Reports.

(e) There is authorized to be appropriated not to exceed $25,000,000 to carry out this section. Appropriation authorization.

SEC. 41. PERIOD OF ENVIRONMENTAL DEMONSTRATION PROGRAM.

(a) EXTENSION OF PERIOD.—Section 1135(b) of the Water Resources Development Act of 1986 (33 U.S.C. 2294 note) is amended by striking out "two-year period" and inserting in lieu thereof "5-year period".

(b) REPORTS.—Section 1135(d) of such Act is amended by striking out "two years" and inserting in lieu thereof "5 years".

WATER RESOURCES DEVELOPMENT ACT OF 1990

PUBLIC LAW 101-640

SEC. 304. PROJECT MODIFICATIONS FOR IMPROVEMENT OF ENVIRONMENT.

(a) REVIEW OF PROJECT OPERATIONS.—Section 1135(a) of the Water Resources Development Act of 1986 (33 U.S.C. 2294 note), is amended by striking "before the date of enactment of this Act".

(b) MODIFICATION PROGRAM.—Section 1135(b) of such Act is amended—

(1) by striking "demonstration program in the 5-year period beginning on the date of enactment of this Act" and inserting "program"; and

(2) by striking "before the date of enactment of this Act".

(c) REPORT.—Section 1135(d) of such Act as amended to read as follows:

"(d) BIENNIAL REPORT.—Beginning in 1992 and every 2 years thereafter, the Secretary shall transmit to Congress a report on the results of reviews conducted under subsection (a) and on the program conducted under subsection (b).".

(d) FUNDING.—Section 1135(e) of such Act is amended by striking "$25,000,000 to carry out this section." and inserting "$15,000,000 annually to carry out this section.".

CITY OF DUNKERTON

POST OFFICE BOX 100 DUNKERTON, IOWA 50626 PHONE (319) 822-4247

SEPTEMBER 11, 1991

PATTY RISSER
CORP OF ENGINEERS
CLOCK TOWER BLDG
ROCK ISLAND IL 61201

PATTY:

AT THIS POINT IN TIME THE CITY OF DUNKERTON HAS NO FUNDING FOR A FLOOD CONTROL PROJECT. WE ARE, HOWEVER, STILL EXPLORING THE POSSIBILITIES.

WE ARE NOT INTERESTED IN THE FLOOD WARNING SYSTEM AT PRESENT.

THANK YOU

Nancy Hoppe

NANCY HOPPE
CITY CLERK

REVISED FEBRUARY 1992

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CEDAR RIVER AND TRIBUTARIES
BLACK HAWK COUNTY, IOWA, AND VICINITY

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MR JOHN A MILLER, CONGRESSMAN NAGLE'S OFFICE 524 WASHINGTON, WATERLOO IA 50701	
DIRECTOR, ADVISORY COUNCIL ON HISTORIC PRESERV OLD PO BLDG #809, 1100 PENNSYLVANIA AVENUE NW WASHINGTON DC 20004	
DIRECTOR, OFFICE OF ENVIRONMENTAL COMPLIANCE DEPT OF ENERGY - ROOM 4G064, 1000 INDEPENDENCE AVE SW WASHINGTON DC 20585	
FEDERAL EMERGENCY MANAGEMENT ADMIN, 500 C STREET SW ROOM 713, WASHINGTON DC 20472	
OFFICE OF ENVIRONMENTAL PROJ REVIEW, DEPARTMENT OF INTERIOR MS 4239-MIB, 18TH & C STREETS NW WASHINGTON DC 20240	18

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GEOLOGICAL SURVEY BUREAU, ENERGY AND GEOLOGICAL RESOURCES DIVN IOWA DEPT OF NATURAL RESOURCES, 123 NORTH CAPITOL STREET IOWA CITY IA 52240	
WATER RES. RESEARCH CENTER, ATTN DR AL AUSTIN 355 TOWN ENGINEERING BUILDING, IOWA STATE UNIVERSITY AMES IA 50010	
MR MORRIS KAY, ADMINISTRATOR US ENVIRON PROT AGENCY-REG VII, 726 MINNESOTA AVE KANSAS CITY KS 66101	3
AREA DIRECTOR-MINNEAPOLIS AREA, BUREAU OF INDIAN AFFAIRS 15 SOUTH 5TH STREET, MINNEAPOLIS, MN 55401	*
MR JAMES C GRITMAN-REGL DIRECTOR, U.S. FISH AND WILDLIFE SERVICE FEDERAL BLDG FORT SNELLING, TWIN CITIES MN 55111	

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REGIONAL FORESTER, FOREST SERVICE US DEPT OF AGRICULTURE, 310 W WISCONSIN AVE-SUITE 500 MILWAUKEE WI 53203	*
DIVISION ENGINEER, US ARMY ENGINEER DIVN-NORTH CENTRAL ATTN NCDPD, 536 S CLARK STREET CHICAGO IL 60605	
HONORABLE TERRY BRANSTAD, GOVERNOR OF IOWA STATE CAPITOL, DES MOINES, IA 50319	
MR STEVEN R MC CANN - DIRECTOR, IOWA DEPT OF ECONOMIC DEVELOPMENT DIVN OF COMMUNITY PROGRESS, 200 EAST GRAND DES MOINES IA 50319	4
MR DARRELL MCALLISTER-BUREAU CHIEF, SURFACE & GRNDWTR PROT BUREAU-DNR WALLACE STATE OFFICE BLDG, 900 EAST GRAND AVENUE DES MOINES IA 50319	
ARNOLD SOHN - CHIEF, PLANNING BUREAU - DNR WALLACE STATE OFFICE BUILDING, 900 EAST GRAND AVENUE DES MOINES IA 50319	
MR LARRY WILSON - DIRECTOR, DEPT OF NATURAL RESOURCES WALLACE STATE OFFICE BLDG, 900 EAST GRAND AVENUE DES MOINES IA 50319	3
MIKE CARRIER, DEPARTMENT OF NATURAL RESOURCES WALLACE STATE OFFICE BLDG, 900 EAST GRAND AVENUE DES MOINES IA 50319	
MR DARRYL HOWELL-BUREAU CHIEF, PRESERV & ECOLOGICAL SVC BUREAU DEPT OF NATURAL RESOURCES, WALLACE STATE OFFICE BLDG DES MOINES IA 50319	

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DIRECTOR, IOWA DEPARTMENT OF TRANSPORTATION OFFICE OF POLICY, 800 LINCOLN WAY AMES,IA 50010	
MR BOB BORTLE, DISTRICT ENGINEER DEPT OF TRANSPORTATION, BOX 741 MASON CITY IA 50401	
DIRECTOR, IOWA DEPT OF SOIL CONSERVATION WALLACE STATE OFFICE BLDG, 900 EAST GRAND AVENUE DES MOINES IA 50319	
MR BERNIE PETERSON, PARK RANGER GEORGE WYTH STATE PARK, 2659 WYTH ROAD WATERLOO IA 50703	
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